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Agriculture

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Service

Southwestern
Region

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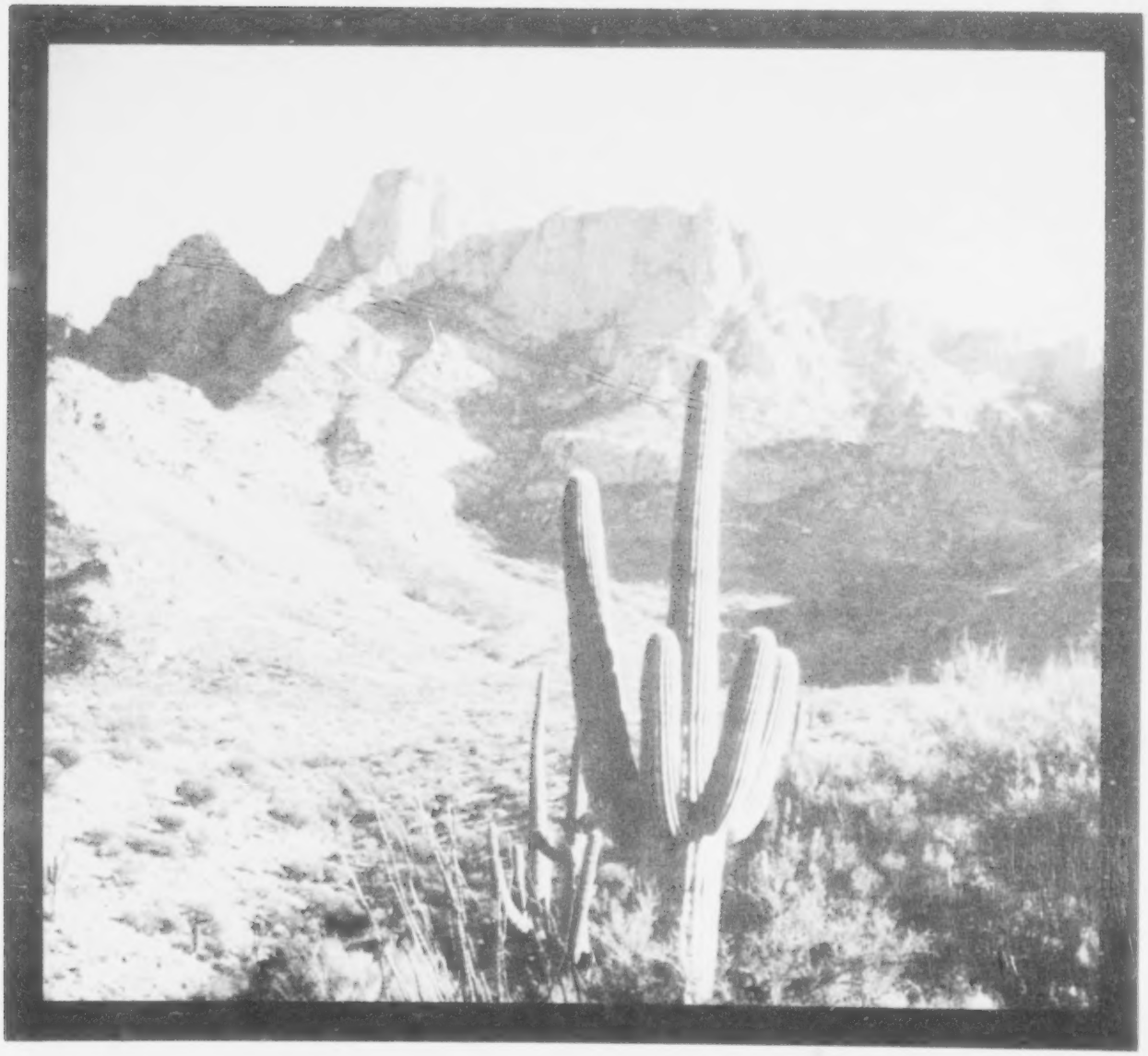
Environmental Impact Statement for the Coronado National Forest Plan



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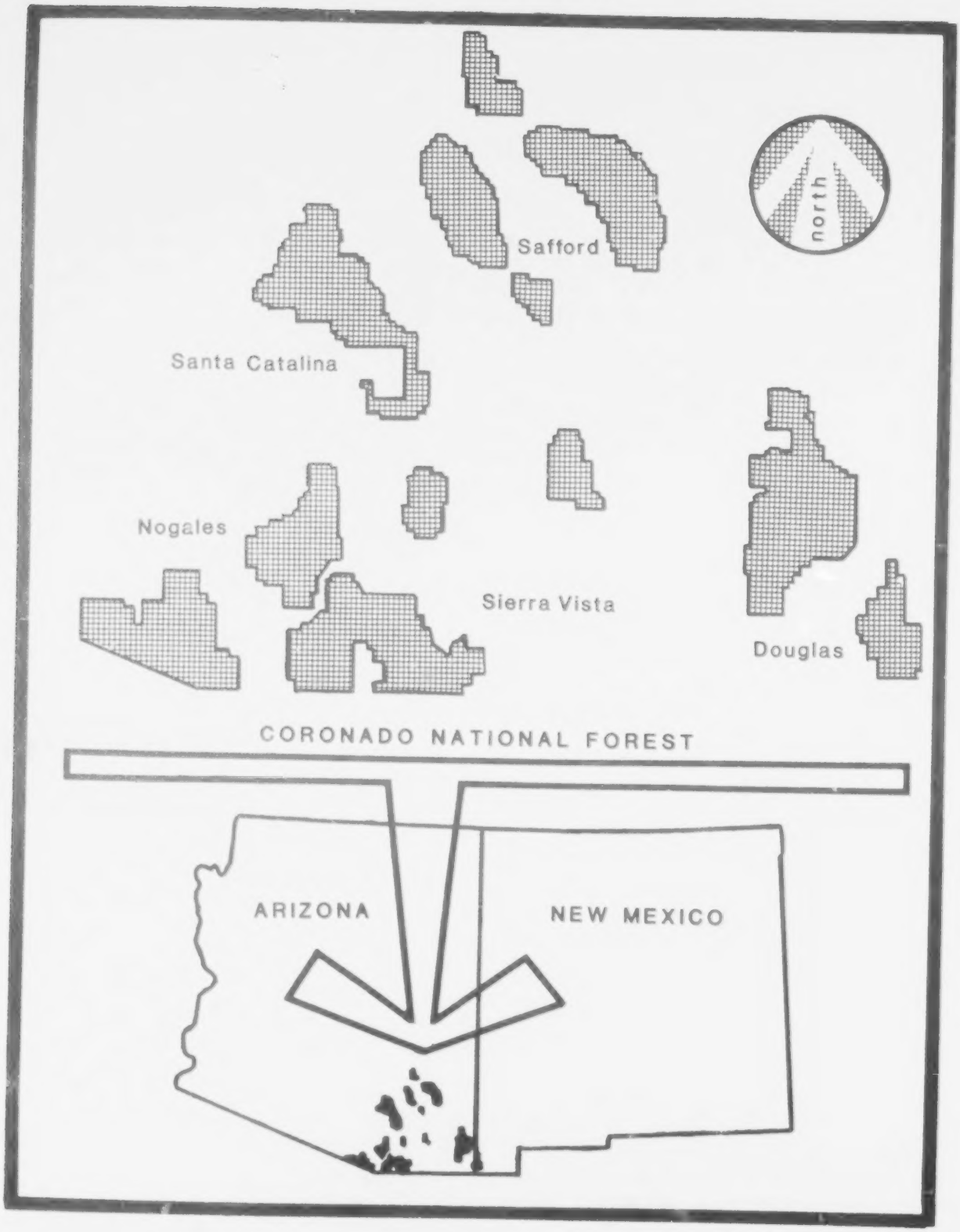

Final Environmental Impact Statement
Coronado National Forest Plan
Pima, Pinal, Cochise, Graham and Santa Cruz
Counties, Arizona
Hidalgo County, New Mexico

EIS # 03-05-86-1

Type of Action: Administrative

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Abstract

A Proposed Action and five alternatives for a Forest Plan (Land and Resource Management Plan) for the Coronado National Forest are described and compared. The Proposed Action and alternatives are:

- PA (Proposed Action): emphasis on simultaneously addressing all issues, concerns and opportunities and producing a mix of commodity and amenity outputs within anticipated budget constraints;
- A (Current): emphasis on a continuation of management as of 1980 or the No Action alternative;
- B (RPA): emphasis on producing recreation and livestock grazing targets assigned in the Regional Guide;
- C: emphasis on economic efficiency in management of the Forest.
- D: emphasis on a natural environment and opportunities for dispersed recreation, wildlife recreation, and wilderness recreation.
- E: emphasis on a mix of resource opportunities to equally address the maximum number of issues and concerns.

The Proposed Action (PA) alternative constitutes the Forest Service preferred alternative. The Coronado National Forest Plan will guide management of the Forest for the next 10-15 years. Revisions can be made whenever necessary.

READEX FICHE best copy available

Coronado National Forest
Land and Resource Management Plan
Environmental Impact Statement

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1. Purpose of and Need for Action

OVERVIEW

This Environmental Impact Statement (EIS) describes a Proposed Action (Preferred Alternative) and other alternatives for management of the land and resources of the Coronado National Forest (Forest) for the next 10 - 15 years. This EIS also evaluates wilderness suitability of four Wilderness Study Areas containing 15,753 acres administered by the Department of Interior, Bureau of Land Management, (BLM). Each alternative addresses local, regional, and national public issues and management concerns; responds to resource management opportunities; and provides for use and protection of resources within current legislative requirements. Every alternative would generate a different mix of goods and services from the Forest. Each was evaluated to determine its potential to provide a sustained yield of goods and services in a way that maximizes long-term public benefits in an environmentally sound manner. Net public benefits (NPB) is an overall expression of the value to the nation of all outputs and positive effects (benefits) less all associated inputs and negative effects (costs) whether they can be quantitatively valued or not. Public benefits are measured by both quantitative and qualitative criteria rather than a single measure or index. The Proposed Action is the alternative that, in the opinion of the Forest Service, provides for a level of goods and services that maximizes long-term net public benefits and is the Forest Service Preferred Alternative.

The EIS describes the affected environment, discloses the significant environmental consequences, and responds to issues, concerns, and opportunities (ICO) identified. An EIS is required by the implementing regulations for the National Forest Management Act of 1976 (NFMA) [36 Code of Federal Regulations (CFR) 219]. A format recommended in National Environmental Policy Act (NEPA) of 1969, Council on Environmental Quality (CEQ) Regulations (40 CFR 1500-1508) was followed. The Proposed Action is the Forest's Land and Resources Management Plan (Plan), which is a separate document. Preparation of the Plan is required by the Forest and Rangeland Renewable Resources Planning Act (RPA) of 1974, as amended by NFMA of 1976. For purposes of NEPA disclosure, the EIS and Plan are treated as combined documents [40 CFR 1506.4]. The wilderness evaluation of BLM lands is being done under an interagency agreement of April, 1980 as amended. For the purpose of this analysis, BLM lands are being evaluated only for wilderness suitability. Allocations of other resource uses analyzed and proposed by this planning effort apply only to Forest Lands, not public lands administered by BLM. Future management consideration of BLM WSAs not recommended for wilderness will be determined through the BLM planning process.

A Notice of Intent to prepare an EIS for the Plan was published in the Federal Register on July 25, 1978. In December 1982 a Draft EIS and Plan were released to the public for comment. The comment period ended in April 1983 after which all comments received were analyzed by an interdisciplinary team in preparation for a Final EIS. On September 7, 1983 the NFMA Regulations were revised (36 CFR 219.17) to provide for roadless area evaluation in response to a court challenge to the Roadless Area Review and Evaluation (RARE II) process. A decision was made to withdraw the previous Draft EIS for the Coronado NF and to prepare a new Draft EIS and Plan for public review. After the close of the comment period, the Plan was revised as necessary, and the Final EIS was prepared, filed with the Environmental Protection Agency, and made available to the public. The Regional Forester used this EIS in making a decision under NFMA for approval of the Plan [36 CFR 219.10-(c)]. This decision is documented in a Record of Decision which accompanies the Forest Plan, and will not become effective until at least thirty (30) days after the Notice of Availability for the Environmental Impact Statement and the Record of Decision appears in The Federal Register.

OBJECTIVES

The purpose of the Plan is to provide for multiple use and sustained yield of goods and services from the Forest to maximize long-term net public benefits in an environmentally sound manner [36 CFR 219.1(c)]. The Forest Plan will accomplish these objectives by:

Determining public issues, management concerns and resource use and development opportunities identified at the national, regional, and local levels.

Defining management practices appropriate to the range of resource conditions found on the Forest.

Assigning combinations of management practices to lands for which they are most suited based on productivity and sensitivity of the land and the needs expressed by the issues and concerns.

Specifying the resource production outputs and schedules associated with implementing specific management practices.

Establishing standards and guidelines for resource use and protection.

Establishing monitoring standards to insure that actual outputs and effects are consistent with those planned.

Providing a framework for project level decisions and for development of budget proposals.

Integrating individual resource planning activities.

Coordinating Forest Service planning activities with the efforts of other Federal agencies, State and local governments, and Native American Tribes.

Providing input to subsequent RPA Programs and Regional Guides.

The Plan will guide management of the Forest until a new Plan is prepared. Management practices and standards and guidelines in the Plan are not irreversible. When a new Plan is prepared, all aspects of the Plan will be reevaluated based on improved data, monitoring results, and new or revised issues, concerns, and opportunities. A new Plan will normally be prepared at 10 year intervals but must be prepared at least every 15 years. Provision for preparation of a new Plan or amendment of the Plan is specified in the regulations for implementation of the NFMA of 1976 (36 CFR 219.10(f) and (g)). The planning horizon used to estimate outputs and effects was 100 years. The displays in the EIS show data for only a specified portion of the planning horizon, the first 50 years. While long range effects have been estimated, the Plan is only valid until a new Plan is prepared committing the Forest to a course of action no longer than 15 years.

The Plan either incorporates, supercedes, or replaces all previous resource or land use management plans prepared for the Forest. Following approval of the Plan, all future permits, contracts, and other instruments for the use and subsequent administrative activities affecting the Forest, including budget proposals, will be based on the Plan (36 CFR 219.10(e)).

The Plan and EIS will guide all subsequent project implementation. Specific project proposals will be tiered to this EIS (40 CFR 1508.28). Tiering means that, if needed, future environmental documents for projects based on the Plan will summarize or incorporate by reference the issues discussed in this EIS. Environmental documents for those projects will focus on site specific issues, concerns, and opportunities unique to the project. Environmental assessments may not be prepared for projects that have been found to have limited context and intensity (49 CFR 1508.27(a) and (b)), to produce no significant effects, individually or cumulatively, to either the biological or physical components of the human environment (40 CFR 1508.14), or to have been addressed in other environmental documents, including this EIS.

PLANNING PROCESS

National and Regional Planning

Forest planning occurs within the overall framework of both national and regional planning as structured by the laws and implementing regulations. The National RPA Program sets policy, standards, guidelines, and resource production objectives in response to identified national issues, concerns, and opportunities. The RPA Program also assigns national production objectives (RPA targets) to each Forest Service Region. A Regional Guide establishes management standards and guidelines, addresses regional issues and concerns, and responds to the National Program by distributing RPA Program targets to the individual National Forests. The Southwestern Regional Guide of August 1983 provides this direction for the Forest.

The planning process is a continuously repeating process in that the information from the Forest level flows up to the national level, is incorporated in the RPA Program, and then flows back to the Forest level. The RPA Program and Regional Guide are updated every five years.

Forest Planning Process

The planning process specified in NFMA regulations (36 CFR 219.12) was followed in development of the plan. The planning process used an interdisciplinary (ID) approach. An ID team was formed of professionals with diverse backgrounds in the physical, biological, economic, and social sciences. The ID team approach ensured that the perceptions and in-depth knowledge of different specialists were integrated into a common management plan. Team members are listed in Chapter 5.

The NFMA planning process represents a logical, rational, and trackable approach to natural resource decision making. The planning sections as described in the NFMA regulations (36 CFR 219, 12(b)-(k)) and used in the planning effort are:

Identification of purpose and need
Development of planning criteria
Inventory data and information collection
Analysis of the management situation
Formulation of alternatives
Estimation of effects of alternatives
Evaluation of alternatives
Preferred alternative recommendation
Plan approval
Monitoring and evaluation

The implementing regulations of NFMA (36 CFR 219) require that a number of analyses be done during the planning process in contrast to the requirements for items to be displayed in the Plan. Examples of process requirements are identification of lands not suited for timber production, suitability and potential capability for forage production, probable occurrence of minerals and potential for future mineral development, and an overview of cultural resources. The EIS and Plan are not intended to contain all of the documentation for process requirements.

Complete documentation is contained in a number of files and process reports. For example, the Analysis of the Management Situation (AMS) report documents most of the planning process requirements specified in 36 CFR 219.13 through 219.26. Appendix B contains a description of the analytical process used to prepare the Plan.

Planning Records

The documents and files that chronicle the forest planning process are available for inspection at the Forest Supervisor's Office, Tucson, Arizona during regular business hours. The planning records contain detailed information and criteria used in developing the Plan as required in 36 CFR 219.10(h). Planning records are incorporated by reference at appropriate points in the text and appendices of this EIS and Plan.

Coordination of Planning

Planning for management of the Forest is coordinated with other land managers and private landowners. Coordination is a continuous process facilitated by the planning effort described in the EIS and Plan.

There are 65,419 acres of private land within the Forest boundary. Some of these inholdings are small scattered tracts which originated as homesteads, and others are larger tracts which have been the result of past land exchanges or lands which were not available when the Forest was proclaimed.

Notification of private landowners was attempted through notices in local newspapers and radio public service advertisements within the zone of influence. Invitations to meetings were also mailed out along with comment response forms. As a result of these efforts, many of the landowners became involved in the planning process.

Three Indian reservations are located immediately adjacent to or in close proximity to the Forest. These include the Yaqui, Papago, and San Carlos Apache Reservations. These Native American groups were notified during the initial

public involvement programs. Follow-up letters were sent requesting any comments regarding the planning effort. Meetings were held with tribal leaders. Further efforts to involve these neighbors were made during the public review period for the EIS and Plan.

Meetings held with the tribes revealed no formalized planning documents which when implemented would have an impact on the Forest or would be impacted by implementation of the Plan.

Numerous Federal, State, county, and local agencies in the area were contacted during the initial public involvement phase, March 1978, and coordination has continued since that time.

Personal contacts were made with representatives of several agencies to review and discuss their planning efforts. These contacts were to identify potential areas of coordination or conflict between the Forest Plan and plans of other agencies.

Planning Areas

The Coronado National Forest includes twelve isolated blocks making up the "mountain islands" of Southern Arizona's desert landscape. These National Forest areas are scattered from near Animas, New Mexico to the edge of Tucson.

Five administrative units, called ranger districts, are headquartered at Douglas, Nogales, Sierra Vista, Safford and Tucson. These units total 1,726,514 acres in Pinal, Pima, Santa Cruz, Cochise, and Graham Counties, Arizona; and Hidalgo County, New Mexico.

Maps in the packet accompanying this EIS show all units.

PUBLIC ISSUES

Issue Development

During March and April of 1978, the Forest held a series of public meetings throughout the planning area in an attempt to identify public issues and concerns to be addressed. More than 500 people attended the meetings. One thousand and two letters and response forms were received.

Review of identified areas of public concern and input from the ID team resulted in an initial list of issues, concerns, and opportunities published in 1978. During the period from 1978 to 1984, the Southwest Regional Guide was completed and the Coronado NF issued a Draft EIS and Plan.

Over 2500 external and internal responses were received during review of these documents. They substantiated many of the original ICOs and caused some to be modified. This resulted in selection of thirty-seven issues for detailed consideration. Appendix A describes issue formulation in detail.

Issues and Opportunities Addressed

Management concerns and issues are termed "issues" and described below. They establish the scope of the EIS (40 CFR 1501.7 and 1508.25). The thirty-seven issues were grouped into fourteen subject matter areas. They can be tracked through Chapters 2, 3, and 4 under the same headings.

1. Recreation and Visual Quality

   As local and tourist populations increase in the Coronado's zone of influence, the demand for outdoor recreation on the National Forest can be expected to continue to exceed the ability of the Forest Service to provide needed services. Several issues are generated by this situation as follows:

   a. Identification of potential overuse areas and establishment of carrying capacities (number of people who can use an area without damage to natural resources).

   b. Regulation of Off-Road Vehicle use to protect other Forest resources and uses, while continuing to provide this much demanded recreational opportunity.

   c. Use of land for recreational development and dispersed uses, and establishment of equitable fees for recreational use.

d. The role of the private sector in providing recreation services on and adjacent to the National Forest must be reassessed.

e. Inventory and management planning for the Coronado's many caves, and location of this resource to recreational, scientific, and wilderness uses.

f. Visual resource integrity in all land management decisions.

2. Wilderness

Potential designation of portions of the Coronado for wilderness has long been studied and debated. Recent wilderness bills for both New Mexico and Arizona have made this designation for most areas under consideration for the duration of this plan. The two bills directed further study on three of the Forest's areas. An interagency agreement between the Forest Service and BLM includes four areas totaling 15,753 acres that will be evaluated for wilderness suitability along with Forest Service areas. Three wilderness related issues are:

a. Formulation of a recommendation to Congress concerning wilderness status for the Bunk Robinson, Whitmire Canyon, and Mt. Graham Wilderness Study areas.

b. Within the constraints of the Wilderness Act, decisions are needed concerning intensity of management and investment for recreation, range, wildlife habitat, and fire management (including planned ignitions) within wilderness areas.

c. Formulation of a recommendation to the Congress on suitability of Baker Canyon, Bowie Mountain, BLM Galiuro, and Guadalupe Canyon Wilderness Study Areas administered by the BLM.

3. Cultural Resources

Southern Arizona and New Mexico have a wealth of historic and prehistoric cultural resources. Although all such resources are currently protected from disturbance by law, many people advocate a more aggressive approach to management of cultural values. The issue is:

a. The amount of time and investment spent for interpretation of cultural sites.

4. Wildlife and Fish

The diversity of plants and animals found on the Coronado is unique in the National Forest System. This uniqueness, coupled with a great deal of local and national interest in this resource, generates a complex management opportunity. Five issues involving wildlife management follow:

a. The amount of time and resources to be given between threatened, endangered, or unique species and other flora and fauna.

b. Critical wildlife habitat must be identified, along with needed controls on other uses (mineral extraction, recreation, etc.).

c. Appropriateness of predator and rodent control, when and where.

d. Fishing lakes which will be maintained, and consideration of any new construction.

e. Maintenance and improvement of the wildlife habitat for future generations in conjunction with other Forest activities.

5. Range

Grazing by domestic livestock is a major use of the Coronado. As demand for other uses increases, potential for conflicts between uses grows. This generates two planning issues:

a. Managing Forest lands for grazing in relation to other uses.

b. Where permitted use exceeds capacity, an appropriate combination of management changes and numbers adjustments must be determined. Scheduling of needed changes is also important.

6. Timber and Forest Products

Sawtimber production on the Coronado is low compared to most other National Forests, but products such as fuelwood, posts, poles, Christmas trees, and beargrass are significant to local users. Silvicultural techniques are a valuable tool for accomplishment of range, wildlife, watershed, recreation, and visual quality objectives. Timber related issues are:

a. Distribution of forest products between commercial users and personal use and availability of permits to non-citizens.

b. Timber harvest amount and objectives.

c. Silvicultural systems and harvest techniques; including clear cutting, snag management, timber stand improvement, reforestation, and harvest of green or dead fuelwood.

7. Plant and Animal Diversity

Because of its unique geographical location, the Coronado includes an unusually wide diversity of vegetation. Wild animals are habitat dependent, and therefore animal diversity tends to be proportional to plant diversity. In the past, vegetation has been manipulated through fire management, grazing, direct plant control, etc. Issues involve further manipulations and uses of the diverse ecosystems as follows:

a. Location and extent of vegetative manipulation.

b. Selection of species for revegetation.

c. Management of uses and management practices in riparian areas.

8. Soil and Water

Much of the water used in Southern Arizona and New Mexico originates on the mountain watersheds of the Coronado. Competition for available water is rapidly increasing, and concern is growing about quantity and quality. The issue can be stated as follows:

a. Management of forest resources to protect or enhance watershed condition from both a hydrologic function and soil productivity standpoint.

9. Minerals

The Southwestern United States continues to produce a significant portion of the nation's mineral supply.

Extraction of minerals has a potential to disrupt other Forest values, if not carefully regulated. In a few sensitive areas it is necessary to exclude mineral activity. The issue can be stated as follows:

a. Identification of sensitive areas and formulation of recommendations for needed withdrawals from mineral entry.

10. Lands and Special Uses

While the Coronado is substantially solid blocks of federal land, there are areas where lands would be better suited for private uses or where administration is made more costly because of the ownership pattern. Conversely, some included private lands are of a National Forest character. Demand for a wide variety of special uses of the Forest continues to grow. Three issues are listed:

a. Revision of land ownership adjustment plans to update lands desirable for acquisition and available for disposal.

b. Management of National Forest land for special uses such as commercial development, summer homes, utility corridors, scientific study sites, roads, apiary sites, etc.

c. Management of National Forest land for astrophysical research purposes on Mt. Graham. Due to the complexity, controversy, and timing of this proposal, it will be handled in a separate EIS.

11. Special Area Designations

The biological uniqueness of the Forest generates a great deal of interest in the area for scientific study and for designation of special management areas to protect biological communities and habitats. Two types of special areas are under consideration:

a. Management of land as Zoological-Botanical Areas to protect biological uniqueness through modified management practices.

b. Management of land as Research Natural Areas to provide opportunities for study of natural ecological processes in undisturbed areas.

12. Protection

Many years of intensive fire control has resulted in significant changes in vegetative composition of the Coronado. In some cases this shift has been towards a less desirable plant community with attendant increase in fire hazard, decrease in forage production, and declining wildlife habitat. As management philosophies have evolved toward fire management, as opposed to control; there is increasing support for a more natural role of fire in the ecosystem. Use of fire as a tool for changing and maintaining vegetative diversity continues to enjoy strong local support. Proposed fire management policies address the following issues:

a. Use of fire as a management tool, including planned ignitions, prescribed natural fire, and management of wildfires.

b. Appropriateness of suppression actions under varying conditions and locations.

13. Facilities (Roads and Trails)

Access to Forest lands is becoming increasingly restricted as development occurs on adjacent lands and as users cause increasing damage on neighboring private land. The Forest transportation system has deteriorated over the past ten years while use has drastically increased. Several access-related issues are apparent:

a. Need for adequate legal rights-of-way to allow public access to the National Forest for all legal uses.

b. Commitment of resources to construction and maintenance of an adequate system of roads and trails (including signing) for Forest users.

c. Resolution of conflicts between trail users (hikers, horses, motorized vehicles).

d. Degree of public access to special use areas. Involves a legitimate need to protect valuable improvements versus the public's right to access to public land.

14. Law Enforcement

National Forests are perceived as places to escape the pressures of urban living and relax in a peaceful atmosphere. Most forest visitors prefer a great deal of freedom from burdensome regulations, but at the same time expect a climate of "law and order". This creates a challenge in development of an agency law enforcement posture. Proposed Law Enforcement policies address:

a. Degree of regulation of forest users, and identification of areas needing more intensive enforcement efforts.

READER'S GUIDE	This Reader's Guide is provided to assist the reader's understanding of the subject matter in subsequent chapters.
Chapter 2	Alternatives Including the Proposed Action. This chapter is based on information and analysis presented in Chapter 3 and Chapter 4. It presents the environmental impacts of the preferred alternative compared to other alternatives, and provides a basis for choice among the various options.
Chapter 3	Affected Environment. This chapter describes the environment of the area affected by the alternatives under consideration including the physical and biological setting, the socioeconomic setting, and current resource situation and management for specific resources.
Chapter 4	Environmental Consequences. This chapter discloses the environmental impacts of all alternatives, any adverse environmental effects which cannot be avoided, the relationship between short-term uses of the environment and maintenance and enhancement of long-term productivity, and any irreversible or irretrievable commitments of resources.
Chapter 5	List of Preparers. This chapter lists people who were primarily responsible for preparing the EIS, or significant background papers.
Chapter 6	Consultation With Others. This chapter lists the businesses, industries, organizations, federal agencies, Native Americans, individuals, local governments and/or officials, State agencies and/or officials, and others that received the EIS and Plan or the Summary document of the EIS.
Glossary	Provides an alphabetical listing of special terms or words and their definitions.
Appendix A	Presents a chronology of public involvement activities which were used to develop the issues addressed. It also includes criteria for issue development, and a listing of the original issues.
Appendix B	Describes the analysis process used in developing the alternatives. It focuses attention on the quantitative methods used to perform the analysis.
Appendix C	Provides a brief description of all Management Prescriptions.

Table 1 lists the resources, uses, and activities evaluated and displayed in the Plan and EIS. These items appear as headings for topics discussed in Chapter 2, Chapter 3, Chapter 4, and form the basis for all evaluation. They were developed from the issues and regulatory requirements in 36 CFR 219 and 40 CFR 1500-1508 to help the reader understand what is discussed in Chapters 2, 3, and 4. The listed items and units of measure have been used consistently throughout the document to enable the reader to relate one chapter with another as well as trace specific issues and opportunities through the document. The relationship between the item and ICO or regulation has also been listed in the table.

It was sometimes difficult to decide under which heading to put a discussion. Many items are interrelated and could be discussed in several places. However, to minimize duplication, most items are only discussed once and are placed under the most appropriate heading. For example, wildlife is a major heading (shown in caps in the left column). The relationship between wildlife and timber is discussed in the wildlife section. Forest visitor days are generated by enjoyment of wildlife. This use is estimated in the recreation section. Therefore, it is in the reader's best interest to become familiar with all headings and discussions in the table.

Table 1. Uses and Activities

Uses and Activities	Unit of Measure [1/]	Connection to Issues, Opportunities and Regulation 36 CFR 219
1. Recreation		
A. Dispersed use, capacity (supply), future use and management level.	Narrative, recreation visitor day (RVD) and management level	Issue 1; 219.21 (all)
B. Trail construction, reconstruction, maintenance, and rights-of-way	Narrative and miles	
C. Off-road vehicle use	Narrative and acres	219.21(g)
D. Developed use, capacity (supply), expected future use and management level	Narrative, RVD and management level	
E. Developed sites	Narrative, RVD, People at One Time (PAOT) and acres	
F. Coordination with Statewide Comprehensive Outdoor Recreation Plan (SCORP) and others	Narrative	
2. Wilderness		
A. Wilderness capacity (supply), expected future use and management plans	Narrative, RVD, Acres, and management level	Issue 2; 219.18 (all)
3. Visual resource	Narrative	Issue 1; 219.21(f)
4. Cultural resource	Narrative	Issue 3; 219.24 (all)
5. Wildlife and Fish		Issue 4; 219.19 (all)
A. Maintenance and improvement of management indicator species habitat and viable population trends	Narrative and acre and acre equivalents	

Table 1. Uses and Activities (Continued)

Uses and Activities	Unit of Measure [1/]	Connection to Issues, Opportunities and Regulation 36 CFR 219
B. Threatened and endangered species habitat and riparian management	Narrative	219.19 (all)
C. Effects of fire, insect, and disease	Narrative	
D. Access and dispersal of hunting, fishing and other uses	Narrative	
E. State comprehensive planning objectives	Narrative	
6. Range		Issue 5; 219.20 (all)
A. Suitability	Narrative and acres	
B. Range condition trend	Narrative and acres	
C. Permitted use/capacity	Narrative and Animal Unit Months (AUM)	
D. Management intensity	Narrative and acres	
E. Improvements	Narrative and activities activities	
7. Timber and Forest Products		Issue 6; 219.14-16 (all)
A. Suitability	Narrative and acres	
B. Sale volume	Narrative, Thousand Board Feet (MBF) and Thousand Cubic Feet (MCF)	
C. Silviculture	Narrative	
D. Snag management	Narrative	
E. Age class distribution tion	Narrative	
F. Timber stand improvement and reforestation	Narrative	
G. Fuelwood	Narrative, MBF and cords	
H. Management objectives	Narrative	
8. Plant and Animal		Issue 7; 219.26
A. Diversity	Narrative and acres	
B. Riparian areas	Narrative	
9. Soil and Water		Issue 8; 219.23 (all)
A. Water yield	Narrative and acre feet	
B. Watershed condition	Narrative and acres	

Table 1. Uses and Activities (Continued)

Uses and Activities	Unit of Measure [1/]	Connection to Issues, Opportunities and Regulation 36 CFR 219
C. Compliance with laws	Narrative	
D. Soil and water improvement	Narrative and acres	
E. Soil loss	Narrative	
10. Minerals		Issue 9; 219.22 (a11)
A. Withdrawals and lease recommendations	Narrative and acres	
11. Lands and Special Uses		Issue 10; 219.25
A. Land Exchange	Narrative and acres	
B. Special Use Permits	Narrative and acres	
12. Special Area Designation		Issue 11; 219.25
A. Research natural areas	Narrative and acres	
B. Zoological/Botanical areas	Narrative and acres	
13. Protection		Issue 12
A. Fire	Narrative	
B. Insect and Disease	Narrative	
14. Facilities		Issue 13
A. Roads and trails, construction, reconstruction, maintenance ROW acquisition, and public access	Narrative and miles	
B. Buildings		
C. Communications		
15. Law Enforcement	Narrative	Issue 14
16. Human and Community Development	Narrative, Present Net Value (PNV), budget, cost, receipts	219.12
17. Resource Planning Act	Targets	219.12

1/ See Glossary for definitions

2. Alternatives Including the Proposed Action

OVERVIEW

This chapter is the heart of the environmental impact statement. The Proposed Action, alternatives considered in detail, and alternatives considered but eliminated from detailed study are described. Major environmental impacts associated with the alternatives are presented in comparative form based on information and analysis presented in Chapter 3, Chapter 4, and the Appendices. Comparisons displayed were selected because they address the issues, concerns, and opportunities described in Chapter 1, and clearly show major differences between the Proposed Action and the alternatives considered in detail. Also included is a summary of the process used to develop alternatives.

Alternatives described and presented in this chapter address ICOs in varying degrees. The alternatives propose different strategies for managing the lands and resources of the Forest. They differ from each other in the land uses and management practices which would occur on different parts of the Coronado and in the scheduling of management activities.

Each alternative is a unique combination of management prescriptions and activity schedules applied to the land. As a result, each would generate a different mix of goods and services for the public, and a different combination of resource outputs, land uses, and environmental effects.

REGULATORY REQUIREMENTS

The process of formulating alternatives responded to a number of regulatory requirements. Regulations (40 CFR 1502.14) for implementing the procedural provisions of the National Environmental Policy Act (NEPA) require that agencies:

> Rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives that were eliminated from detailed study, briefly discuss the reasons for their elimination.
>
> Devote substantial treatment to each alternative considered in detail including the Proposed Action so reviewers may evaluate their comparative merits.
>
> Include reasonable alternatives not within the jurisdiction of the lead agency.
>
> Formulate reasonable alternatives which may require a change in existing law or policy to implement, if necessary, to address a major public issue, management concern, or resource opportunity identified during the planning process.
>
> Include a No Action Alternative.
>
> Identify the agency's preferred alternative--Proposed Action.
>
> Include appropriate mitigation measures not already included in the Proposed Action or other alternatives.

In addition, the National Forest Management Act implementing regulations (36 CFR 219.12(f)) provide the following requirements for formulating alternatives:

> Alternatives shall be distributed between the minimum resource potential and the maximum resource potential to reflect, to the extent practicable, the full range of major commodity and non-commodity resource uses and values that could be produced from the Forest.
>
> Alternatives shall reflect a range of resource outputs and expenditure levels.
>
> Alternatives shall be formulated to facilitate analysis of opportunity costs and of resource use and environmental tradeoffs among alternatives and between benchmarks and alternatives.
>
> Alternatives shall be formulated to facilitate evaluation of the effects on present net value, benefits, and costs of achieving various outputs and

values that are not assigned monetary values but that are provided at specific levels.

Alternatives shall provide different ways to address and respond to the major public issues, management concerns, and resource opportunities identified during the planning process.

At least one alternative shall be developed which responds to and incorporates the RPA program tentative resource objectives for each forest displayed in the regional guide.

At least one alternative shall reflect the current level of goods and services provided by the unit and the most likely amount of goods and services expected to be provided in the future if current management direction continues. Pursuant to NEPA procedures, this alternative shall be deemed the "no action" alternative.

Each alternative shall represent to the extent practicable the most cost efficient combination of management prescriptions examined that can meet the objectives established in the alternative.

Each alternative shall state at least--the condition and uses that will result from long-term application of the alternative; the goods and services to be produced, the timing and flow of these resource outputs together with associated costs and benefits; resource management standards and guidelines; and the purposes of the management direction proposed.

ALTERNATIVE DEVELOPMENT PROCESS

A broad range of alternatives was formulated by the Interdisciplinary Team using a specific and structured analytical process as required in the planning regulations 36 CFR 219.12(e) and (f)).

Analysis Areas

For analysis purposes the Forest was subdivided into 153 units of land called analysis areas. Analysis areas were identified based on public issues, management concerns, resource development opportunities, biological capability, suitability for management practices, and economic factors.

Existing wilderness areas (See Chapter 3) are subject to laws which commit them to wilderness management. This commitment was unchanged during analysis of the alternatives. Nonwilderness options were not evaluated for these areas.

Management Prescriptions

Management prescriptions are combinations of management practices, activities, standards, and guidelines designed to achieve specific multiple-use goals and objectives. Management prescriptions include all the necessary mitigation and resource coordination measures required by laws, regulations, and policies. Different management prescriptions were developed to emphasize individual resource potentials, continue current management, manage at a reduced intensity, and address public issues and management concerns in a variety of ways. A number of possible management prescriptions were developed for each analysis area and are discussed in more detail in Appendix B.

Benefits and Costs

Resource outputs and costs of implementation for all management activities and practices were estimated for each combination of management prescriptions and analysis areas. Refer to Appendix B for a complete listing of the resource outputs and cost categories which were used in the analysis.

Cost estimates for each management prescription were developed from historical records of Forest Service costs. Non-Forest Service costs for private permittee investment necessary to carry out range allotment agreements, and estimated state government costs to carry out the ongoing state fish and wildlife programs were also included in the analysis.

Resource outputs that have an existing market and are sold, as well as those resource outputs which could potentially be sold, were assigned benefit values and are called "priced benefits." Timber; firewood; dispersed, developed, wildlife and wilderness recreation; livestock grazing capacity; and water yield were assigned benefit values. All benefit values were based on the point in the

production process when the output is removed from the Forest. Refer to Appendix B for a complete listing of the values used.

No attempt was made to assign benefit values to many other outputs such as visual quality, threatened and endangered species, changes in income and employment, or community lifestyles. These kinds of outputs produced "nonpriced" benefits that were also considered in the analysis. Nonpriced benefits were considered as constraints or restrictions on the production of priced benefits.

Present Net Value

The priced benefits and the costs of all management practices and activities were used to calculate the present net value of all alternatives considered in the analysis. PNV is the difference between the present value of the priced benefits and the present value of all costs discounted at a 4 percent interest rate.

PNV is a means of comparing several different investment opportunities to see which would be the best investment. It is calculated from the sum of all of the benefits--the quantity of priced outputs multiplied by the benefit value--minus the sum of all costs necessary to produce the priced and nonpriced outputs. Since the dollars that are being added occur over a period of years, some adjustment must be made so they are comparable. The mechanical process by which all of these dollars are adjusted back to the present year so they can be compared is called "discounting." The discount rate of four percent used in forest planning was established by the Chief of the Forest Service, and is applied uniformly throughout the nation.

PNV is a relative indicator of economic efficiency and was used as a means to develop and compare alternatives. The objective in development of each alternative was to maximize PNV; thus, each alternative is the most economically efficient combination of management prescriptions that will achieve a given set of priced and nonpriced goals and objectives.

Net Public Benefits

The NFMA Regulations (36 CFR 219.1) describe the objective of land and resource management planning on National Forest lands:

> The resulting plans shall provide for multiple use and sustained yield of goods and services from the National Forest System in a way that maximizes long term net public benefits in an environmentally sound manner.

Since not all costs and benefits can be priced in the analysis, PNV was not the only index used to develop, compare, and evaluate alternatives. Alternatives were evaluated to determine how well they maximize net public benefits. Net public benefits (NPB) is an overall expression of the value to the nation of all outputs and positive effects (benefits) less all associated inputs and negative effects (costs) whether they can be quantitatively valued or not. Net public benefits are measured by both quantitative and qualitative criteria rather than a single measure or index such as PNV. Alternatives having the highest PNV may not always provide the highest net public benefits when nonpriced benefits and costs are considered.

Computer Model

The goal in alternative development was to find the most economically efficient combination of management prescriptions that would achieve a given set of priced and nonpriced goals and objectives. Since there were 153 analysis areas, each having an average of 10 possible prescription levels, hundreds of possible combinations had to be analyzed. This was an impossible job without computer assistance.

A linear programming model was used as a tool to do the millions of calculations to test possible combinations of areas, prescriptions, and schedules that would maximize economic efficiency while meeting the priced and nonpriced goals and objectives specified for a given alternative. Goals and objectives for each alternative were determined on the basis of legal requirements, policies, issues, management concerns, and desired levels of priced and nonpriced benefits and costs.

Analysis of model outputs indicated the Forest could not be managed to meet some combinations of objectives. The limitations of land and resources, impacts on

environmental quality, or the practical limits of budgets often caused an infeasibility. The ID Team then modified the objectives and made other "runs" of the computer model to find practical combination of land, activities, and schedules which would best meet the goals of that alternative. Model solutions were validated and adjusted by the ID Team to insure that solutions were implementable options. Because the computer model is only an aid for analysis that does not model all components of net public benefits, adjustments in model solutions were made by the ID Team based on professional expertise and prior experience. While the alternatives may not exactly match a computer solution, relative differences between alternatives have not been affected. Refer to Appendix B for more detailed discussion of the computer model and constraints used.

Benchmark Formulation

One phase of the analysis leading to formulation of alternatives was development of benchmarks. A benchmark is an alternative which defines the limits of feasibility for the management and utilization of Forest resources.

Benchmarks were designed to emphasize the production of individual resource outputs, to maximize economic efficiency, and to define the least intensive level of management. Benchmarks encompass the range of possibility from which alternatives can be developed.

Many of the first planning actions involved the creation of benchmarks and the inspection of their outputs, costs, and assumptions. They are a combination of land capability, management practices, and schedules to achieve certain objectives for the Forest as a whole. Unlike alternatives, they are usually not fully implementable, because they lack consideration of likely budgets, specific geographic location, and other details. They do provide significant information about the maximum biological and economic production opportunities and they assist in evaluating the compatibilities and conflicts between market and non-market objectives, and they define the range within which integrated alternatives will be developed.

Some benchmarks are economically based, while others indicate the maximum physical productivity of land for various resources. In these benchmarks analyses, each option must include meeting minimum management requirements of 36 CFR 219.27, such as protecting the productivity of the land and meeting minimum air and water quality standards.

Analysis of the Management Situation

During the Analysis of the Management Situation (AMS), the Forest's current management situation was compared and evaluated against the Forest's potential to supply goods and services as demonstrated by the maximum benchmarks. This analysis provided a basis for evaluating the need for management changes and developing alternatives. The AMS contains much of the documentation for procedural requirements specified in 36 CFR 219, particularly the requirements to be covered in the planning process.

Alternative Formulation

Appendix B contains details concerning the formulation of Alternatives. In brief the ID Team formulated alternatives by:

Developing a broad range of prescriptions representing minimum to maximum resource production potentials and expenditures within management requirements designed to protect and enhance long-term productivity.

Formulating benchmark alternatives to define the feasible decision space within which alternatives considered in detail would be developed.

Defining goals and objectives for tentative alternatives considered in detail based upon the range of outputs determined by benchmarks, issues, and concerns to be addressed and opportunities presented; cost efficiency; financial feasibility and; nonpriced public benefits.

Refining tentative alternatives into alternatives considered in detail by analyzing results for achievement of goals and objectives, optimum integration and production, cost efficiency, financial feasibility, and production of public benefits.

ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

This section deals with those alternatives considered and subsequently eliminated from further study. These alternatives were generated as benchmarks, departures from nondeclining timber yield, or as other alternatives considered but not evaluated in detail in the EIS. The reasons they were not considered further are presented.

Minimum Level

The purpose of the minimum level benchmark is to estimate naturally occurring outputs and unavoidable costs of maintaining the Forest as part of the National Forest System. This benchmark enables controllable outputs and discretionary costs to be identified. The minimum level is a Forest-wide management strategy that would meet the following statutory requirements: 1) administration of unavoidable, nondiscretionary land uses; 2) prevention of impairment of the productivity of the land; and 3) protection of the life, health, and safety of incidental users. The sum of these activities defines the long-term fixed costs of public ownership.

The minimum level benchmark was eliminated from further study because it did not conform to existing Legislation governing management and use of the Forest, nor did it address issues and concerns. Although eliminated from further study, the benchmark does provide a basis for comparing base costs and benefits with those alternatives considered in detail.

The minimum level was not modeled in the linear programing computer model. Outputs and costs were estimated by resource specialists independent of the model.

Low Intensity/ Budget

The purpose of this benchmark is to determine outputs and costs associated with managing the Forest at a low intensity level and/or reduce budget level. This alternative was not considered in detail because the level of management does not respond to any of the issues and concerns. This benchmark meets only minimum management standards. Developed recreation sites are operated at reduced service levels and will be closed when they deteriorate below minimum health and safety standards. Trails will be closed when they deteriorate below safe use level or cause excessive erosion. Wilderness is not managed resulting in significant deterioration of the wilderness resource and experience. Timber production is significantly reduced since harvest is limited to currently roaded areas. Grazing capacity and permitted livestock use decline as management is allowed to decrease and improvements needed for maintenance of capacity deteriorate. Use and capacity balance significantly below current levels in Period 3.

Maximize Single Resources

These benchmarks maximize production of a single resource while maximizing present net value. They were developed for timber, grazing capacity, recreation, wildlife, and watershed condition. As each single resource was maximized, other resource outputs generally occurred at low levels. These benchmarks were developed to determine the Forest's potential to produce goods and services and to evaluate the Forest's potential to resolve issues, concerns, and opportunities. They were utilized to guide the formulation and analysis of all alternatives.

Some single resource benchmarks were eliminated from detailed analysis because each alternative responded to only a few public issues while management of other resources would be neglected. Others were eliminated because they were similar to alternatives specifically formulated to respond to issues. Few constraints were placed on the model during the analyses. Therefore, combinations of budgets and prescriptions assigned by the model for each of these benchmarks may not represent feasible solutions. NFMA requires that the Forest Plan provide for multiple use and sustained yield of products and services in accordance with the Multiple Use Sustained Yield Act of 1960. Maximizing a single resource does not always satisfy this requirement.

Maximize Present Net Value

Two benchmarks were modeled which maximize PNV. One maximized PNV with market values for timber products. fuelwood sold, livestock grazing capacity, and developed recreation visitor days (Max PNV Market Value). The other benchmark, (Max PNV Assigned Values), maximized PNV for resources with market values as well as those resources with assigned values for dispersed, wildlife, and wilderness recreation visitor days.

The Max PNV Assigned Values benchmark was considered in detail after being slightly modified to provide manageable boundaries for the new wilderness acreage allocations.

The Max PNV Assigned Values Benchmark is used as a comparison in the Economic Factors and Present Net Value Tradeoff sections of this chapter.

The Max PNV Market Value benchmark was not considered in detail because the resulting low intensity management does not adequately respond to issues, concerns, and opportunities.

Other Alternatives Considered

Increasing the rate of improvement in watershed condition by widespread application of intensive measures was also considered but not modeled. This was not considered further because an adequate range of acres treated was provided by the alternatives considered in detail.

Alternatives with budget constraints which differ from Alternatives A and PA were considered. It was decided that the Alternatives considered in detail and the Low Intensity Benchmark provided an adequate range of budget options.

Alternatives to maximize and minimize new wilderness allocation were developed as part of the analysis of the three Wilderness Study Areas. These maximum and minimum levels, plus other area and boundary combinations are represented in the alternatives considered in detail.

Also developed but eliminated from detail, was an alternative to maximize new wilderness allocation while sustaining other resource outputs at 1981 levels. This was not considered further because most of the Forest outside of wilderness was allocated to a single resource use (livestock grazing) and was not responsive to ICOs. The levels of resource output are reflected in Alternative B (RPA).

ALTERNATIVES CONSIDERED IN DETAIL

Each of the alternatives considered in detail meets the requirements of the NFMA regulations and provides goods and services at a level responsive to all or part of the issues while maximizing present net value. Appendix B describes the model constraints used in formulating the alternatives including alternatives not considered in detail.

Issues developed during the scoping process and the response to objectives assigned in the Regional Guide are addressed differently in each alternative. These differing emphases are reflected in the varying mix of management prescription assignments among alternatives. The Proposed Action, RPA, and the No Action Alternatives are identified. Resource outputs were projected for 50 years.

The location of prescription assignments for the Proposed action and other alternatives is illustrated on maps in the packet which accompanies this document. Chapter 2 and Appendix C describe the management prescriptions for each alternative.

Range of Alternatives Considered

The alternatives considered were developed within the resource production levels, both minimum and maximum, established by the benchmarks. The Low Intensity Benchmark established the base level with subsequent alternatives providing outputs at or above this level. The maximum single resource benchmarks formed the cutoff level for outputs at the upper end of the decision space. As objectives for alternatives were formulated, the output levels for each resource were determined by consulting the range of outputs established by the benchmarks. Limits for each resource were specified by alternative to insure outputs fell within the range or decision space established by the benchmarks. The alternatives considered represent a broad range of reasonable alternatives.

Proposed Action Alternative (Preferred Alternative)

The Proposed Action provides for a mix of resource opportunities while improving the condition of all basic resources. It attempts to address the maximum number of I.C.O.s within a budget constrained to reflect anticipated appropriations.

Response to I.C.O.s:

a. All riparian areas will be in satisfactory or better condition by Period 5.

b. By the end of Period 5, 76 percent of the acres will be in satisfactory watershed condition. Forest-wide soil loss will be reduced below that of Alternative A by Period 5.

c. Recommends designation of a new wilderness for the Mt. Graham Wilderness Study Area. Bunk Robinson and Whitmire Canyon are not recommended for wilderness. The BLM Galiuro WSA will be recommended as an addition to the existing Galiuro Wilderness. All other BLM WSAs will be recommended for nonwilderness uses. Wilderness management efforts are concentrated in high use areas.

d. Limit the budget to $6000 M per year for the first time period and $7073 M dollars in all other periods.

e. The following changes will be recommended for the existing Research Natural Area (RNAs) system:

1. Reduce the size of Santa Catalina RNA from 4131 acres to 890 acres. The size reduction will eliminate conflicts with intent of the RNA system by eliminating a heavily used dispersed recreation area, including trails.

2. Increase the size of Pole Bridge RNA from 460 acres to 550 acres. The present area does not include a representative example of Chihuahua pine.

3. Add a new RNA (350 acres) within the Research Ranch to represent the oak-woodland. This ecosystem need was identified in the Regional Guide.

4. Increase the size of the Goodding RNA from 545 acres to 2015 acres. This will increase the size of the ecosystem representation found in Goodding RNA and add the Sinaloan Thornscrub ecosystem which is not represented in existing RNAs.

f. Recommend a Zoological and Botanical Area (ZBA) in the South Fork, of Cave Creek (762 acres) excluding a corridor 10 feet wide from each side of the road, the recreation site limits, and the existing summer homes.

g. Recommend a portion of Guadalupe Canyon (Peloncillo Mountains) as a Zoological area (3478 acres).

h. The recreation issues are addressed by concentrating efforts in high use areas. Most sites are managed at less than standard levels and little new construction is planned. Reconstruction is emphasized. Total developed recreation demand is only half satisfied.

i. The wildlife issues are addressed through use of indirect and some direct habitat improvement. Habitat conditions are improved for most species groups except cavity nesters.

j. Grazing capacity and use are balanced by the end of the second period.

k. Timber and fuelwood are supplied at moderate but sustained levels.

Alternative A (Current No Action)

Alternative A projects current resource management as of 1980. This is the No Action Alternative required by the NEPA regulations. The alternative provides a base for comparison of other alternatives by projecting existing management into the future. The budget is constrained to approximate the F.Y. 1980 actual budget.

Response to I.C.O.s:

a. Riparian areas are in satisfactory or better condition by Period 5.

b. By the end of Period 5, 71 percent of the acres will be in satisfactory watershed condition.

c. No FS or BLM wilderness study areas are recommended for wilderness. However, they are managed to protect wilderness values, therefore, most effects are the same as wilderness management. Wilderness management continues at low intensity.

d. New RNAs are not proposed and existing RNAs are not changed.

e. The budget is limited to $5600 M per year.

f. No zoological and botanical areas are proposed including the South Fork of Cave Creek.

g. Recreation sites are managed at less than standard level and no new construction is proposed.

h. Wildlife issues are addressed through emphasis on maintenance of habitats for most species groups.

i. Grazing capacity and use are balanced by the end of Period 2.

j. Timber and fuelwood are supplied at moderate but sustained levels.

Alternative B (RPA)

Alternative B attempts to meet RPA objectives assigned by the Regional Guide in Periods 1-5.

Response to I.C.O.s:

a. Riparian areas are in satisfactory or better condition by Period 5.

b. By the end of Period 5, 87 percent of the forest acreage will be in satisfactory watershed condition.

c. No FS or BLM Wilderness Study Areas are recommended for wilderness designation.

d. Santa Catalina RNA will be reduced to 890 acres. Pole Bridge RNA is expanded and two new RNAs (Canelo) and (Sycamore Canyon) will be recommended.

e. The budget is unlimited.

f. A zoological/botanical area will be proposed in the South Fork of Cave Creek above the existing campground.

g. All recreation sites are managed at standard levels and new sites are constructed to meet most of the demand.

h. Wildlife issues are treated at a low level. Viable population levels are maintained, but habitat components decline for several species groups.

i. Grazing capacity and use are balanced in Period 2.

j. Timber and fuelwood are supplied at the highest level of any alternative for the first 50 years, however, yields are drastically reduced after the fifth period.

Alternative C

Alternative C is similar to the benchmark alternative called Maximize Present Net Value for Assigned Values, therefore, the emphasis is on economic efficiency in management of the Forest. The benchmark was modified to address the wilderness issue, and the issue about management of the South Fork of Cave Creek.

Response to I.C.O.s:

a. Riparian areas are in satisfactory or better condition by Period 5.

b. By the end of Period 5, 81 percent of the forest acreage will be in satisfactory watershed condition.

c. All or portions of each FS and BLM Wilderness Study Area are recommended for wilderness designation.

d. Santa Catalina RNA will be reduced to 890 acres and no new RNAs will be proposed.

e. The budget is unlimited.

f. A zoological/botanical area will be proposed in the South Fork of Cave Creek and existing roads will be closed to public vehicle travel.

g. All recreation sites are managed at standard levels and new sites are constructed to meet most of the demand.

h. Wildlife is emphasized as habitat for most species groups show increases.

i. Grazing use and capacity balanced by the end of Period 2.

j There is no sawtimber harvest and fuelwood is supplied at a low level.

Alternative D

Alternative D emphasizes recreation, watershed, and wildlife values and opportunities Forest-wide. Opportunities such as fuelwood harvest and livestock use would be secondary considerations. This Alternative was proposed by a citizen's group.

Response to I.C.O.s:

a. Riparian areas will be in satisfactory or better condition by Period 5.

b. By the end of Period 5, 80 percent of the forest acreage will be in satisfactory watershed condition.

c. All suitable acres in FS and BLM Wilderness Study Areas are recommended for wilderness designation and the roadless portions of the Whetstone, Dragoon, North End (Chiricahua) and Tumacacori Mountains will be managed for primitive and semi-primitive nonmotorized recreation opportunities.

d. All identified RNAs are proposed for designation.

e. Both the South Fork and Main Fork of Cave Creek will be recommended for zoological/botanical area designation along with Clanton Draw, O'Donnel Creek, Ramsey Canyon, and Pine-Ramanote Canyons.

f. The budget is unlimited.

g. Recreation issues are addressed with emphasis on dispersed opportunities. Developed recreation demand will be partially met through new construction. Some sites will be managed at reduced service levels.

h. Grazing use and capacity will balance by the end of Period 2 emphasizing nonintensive and cost-efficient practices. Maximum use levels will be 15 - 30%.

i. Wildlife issues will be addressed as habitats for nongame, special interest, and T&E species are emphasized.

j. Timber and fuelwood are supplied at low levels.

Alternative E

Alternative E emphasizes a mix of resource opportunities on lands most suitable for the particular type of use. Emphasis is on a balanced resolution of all issues.

Response to I.C.O.s:

a. Riparian areas will be in satisfactory or better condition by Period 5.

b. By the end of Period 5, 80 percent of the forest acreage will be in satisfactory watershed condition.

c. The Mt. Graham Wilderness Study Area is recommended for wilderness designation. A portion of the Bunk Robinson WSA is recommended along with a portion of Baker Canyon WSA and all of the Guadalupe Canyon WSA. The BLM Galiuro WSA is recommended for addition to the existing Galiuro Wilderness. Other FS and BLM WSAs are recommended for nonwilderness uses.

d. Santa Catalina RNA will be reduced to 890 acres and no new areas proposed.

e. The budget is unlimited.

f. No zoological/botanical areas will be proposed.

g. Recreation issues are addressed with emphasis on a mix of recreation opportunities. Developed recreation demand will be partially met as existing sites are rehabilitated and some new sites are constructed. Some sites will be managed at less than standard levels.

h. Grazing use and capacity will balance by the end of Period 2.

i. Wildlife issues will be addressed as habitats for game and T&E species are emphasized.

j. Timber and fuelwood are supplied at a moderate sustained level.

COMPARISON OF ALTERNATIVES

Acreage Distribution

Each alternative results in different combinations of management prescriptions and different acreages assigned to various management prescriptions. One way to evaluate the effects of the alternatives is to compare the acreages assigned to the management prescriptions in each alternative. Table 2 shows the distribution of acreage to various management emphasis and intensity levels by alternative. Additional detail on prescriptions can be found in Appendix C.

Table 2. Acres by Management Emphasis and Intensity for Each Alternative [1/]

Management Prescriptions		Thousand Acres By Alternative					
Primary Emphasis	Intensity Level	PA	A (Current)	B (RPA)	C	D	E
Manage for visual resources and semi-primitive non-motorized and motorized dispersed recreation opportunities.	Low	26.1	0	0	0	0	0
	Moderate	0	100.5	0	0	0	0
	High	71.6	0	111.7	156.4	85.4	112.2
Manage for a variety of dispersed recreation opportunities. Timber and fuelwood harvest benefit recreation and wildlife values.	Low	0.6	0	0	0	0	0
	Moderate	0	31.9	0	0	30.6	0
	High	16.4	0	0	0	0	30.6
	Maximum	13.7	0	0	0	0	0
Manage for a wide variety of dispersed recreation opportunities.	Moderate	9.2	14.9	0	0	0	0
	High	5.2	0	0	0.7	0.7	0.4
	Maximum	0.4	0	0	0	0	0
Manage for a variety of developed recreation opportunities. (Existing and new sites)	Moderate	4.0	4.0	0	0	0	0
	High	0.2	0	6.7	6.7	4.7	4.7
Manage for sustained production of livestock forage fuelwood and game animal habitat.	Low	134.2	0	0	0	0	0
	Moderate	503.6	1098.3	0	0	0	0
	High	251.3	0	155.8	109.8	33.8	590.2
Manage for intensive game animal habitat maintenance and improvement. Production of livestock forage and fuelwood will be compatible with management of the game habitat.	High	239.6	0	2.5	1014.1	920.8	517.1
	Maximum	0	0	3.7	4.5	0	0
Manage to perpetuate the unique wildlife or vegetative species. Other resource uses will be compatible with sustaining the unique resources.	Moderate	35.5	43.1	21.6	0	0	21.6
	High	6.1	0	1.7	6.0	11.8	30.7
	Maximum	0	0	0	0	37.2	3.0
Manage to provide opportunities for nondisruptive research and education. (Research Natural Areas)	Moderate	0	3.8	0	0	0	0
	High	3.4	0	3.8	3.8	6.7	3.8
Manage for wilderness values and uses while providing opportunities for nondisruptive research and education. (Research Natural Areas inside Wilderness)	Low	0.9	0	0	0	0	0
	Moderate	0	5.7	0	0	0	0
	High	2.7	0	2.0	1.9	8.6	1.9

Table 2. Acres by Management Emphasis and Intensity for Each Alternative [1/] (Continued)

Management Prescriptions		Thousand Acres By Alternative					
Primary Emphasis	Intensity Level	PA	A (Current)	B (RPA)	C	D	E
Manage for wilderness values while providing livestock grazing and recreation opportunities that are compatible with wilderness. (Wilderness Areas)	Low	225.1	0	0	0	0	0
	Moderate	36.0	333.5	0	0	0	0
	High	136.5	0	337.2	421.8	405.1	410.3
Manage for wilderness values while perpetuating the unique wildlife or vegetative species. (Zoological-Botanical Areas)	High	0	0	0	0	16.3	0
Manage to perpetuate the unique wildlife or vegetative species. (Zoological-Botanical Areas)	High	4.2	0	0.2	0.8	21.0	0
Manage to maximize livestock grazing opportunities while meeting at least minimum legal requirements for other resources.	Maximum	0	0	1079.6	0	0	0
Manage for primitive recreation opportunities.	High	0	0	0	0	143.8	0
Manage to protect future wilderness values. (Wilderness Study Areas)	Moderate	0	90.8	0	0	0	0
TOTALS		1726.5	1726.5	1726.5	1726.5	1726.5	1726.5

[1/] Appendix C provides additional information on management prescriptions and management areas.

As can be seen in Table 2, The Proposed Action has the largest variation in management intensity levels. In all alternatives, the goal is to maximize economic efficiency when matching management prescriptions with land areas. The budget limitation in The Proposed Action concentrates the higher intensity management on the most productive or most desirable lands and low intensity on less efficient lands. Management choice in Alternative A is limited to current prescriptions only, therefore there is little opportunity to improve management efficiency. Alternative B manages most of the Forest at a very high intensity level in order to meet certain resource objectives. Alternatives C, D, and E use different mixes of management emphasis and intensity to achieve the particular objectives in the most efficient manner.

Issue Resolution

Selected issues are one of the main factors that drive the planning process. They help determine the scope of the analysis and the nature and range of alternatives considered in detail. An important comparison among alternatives is to compare how well each alternative addresses the selected issues. Table 3 provides a comparison of how each alternative responds to each of the selected issues for which there were significant differences. Analysis indicated that several of the issues were addressed equally by all alternatives. These have not been included in the table but are discussed in Chapter 4. In many cases, issues are addressed by the level of output produced by each alternative and are shown in the quantifiable comparison section of the table. Other aspects of the selected issues are subjective or nonquantifiable and discussed narratively in the nonquantifiable section of the table. Because of the number of issues and complex facets of the issues, Table 3 is long and somewhat complex but deserves detailed study because of the importance of the issues in the planning process.

Table 3. Comparison of Issue Resolution by Alternative

Issue #1: Recreation

Alternative	Quantifiable Comparison - Period 5 New Development (PAOTS) 1/	(ACRES)	Average Annual Recreation Use (MRVD) 2/ and % of Projected Demand Developed	Dispersed (excludes wilderness)	Wildlife	Non-quantifiable Comparison
Projected Demand			3179	2237	853	
PA	52.5	175	1565 49%	1798 80%	646 76%	Improved management of key developed and dispersed recreation areas will increase user satisfaction and ease user conflicts. Site deterioration will be reduced due to emphasis on rehabilitation of existing sites. Some new site construction will improve user satisfaction and reduce conflicts on key areas.
A	0	0	1435 45%	1852 85%	626 73%	No new site development will not meet projected needs for developed sites. Less than standard management in all areas will not reduce conflicts nor improve satisfaction.
B	822.5	2750	2715 85%	1888 84%	602 70%	Standard service management and maximum new site development will eliminate most user conflicts and improve user satisfaction by providing adequate facilities and a variety of opportunities. Site deterioration will be low because of standard service management, rehabilitation of existing sites and high maintenance levels.
C	822.5	2750	2715 85%	1767 79%	698 82%	Same as B.
D	309.3	1031	2152 68%	1804 81%	665 78%	Most user conflicts will be eased with standard service management. Site deterioration will continue, but at a sharply reduced rate. New site construction will occur in areas of highest demand. User satisfaction will be increased.
E	309.3	1031	2152 68%	1767 78%	672 79%	Same as D.

1/ PAOT - People at one time. See Glossary, page 187.
2/ MRVD - Thousands of recreation visitor days. See Glossary, page 190.

Table 3. Comparison of Issue Resolution by Alternative (continued)

Issue #1: Recreation
Off-road Vehicle Use

Alternative	Quantifiable Comparison - All Periods M-Acres Closed	M-Acres Restricted	M-Acres Open	Non-quantifiable Comparison
PA	407	1320	0	All Wilderness and Research Natural Areas (RNAs) are closed. Use on the Santa Catalina Ranger District (SCRD) is restricted to roads only. Use on other Ranger Districts is restricted to roads and trails.
A	434	333	960	All Wilderness, RNAs and WSAs are closed. Use on SCRD is restricted to roads only. Use is restricted to roads and trails on other Districts. Approximately 56% of the Forest is open for off-road travel.
B	344	141	1242	All Wilderness and RNAs are closed. Remainder of Forest is open to off-road travel except for some sensitive sites.
C	427	1300	0	Same as PA.
D	580	1147	0	Same as PA, except four unroaded areas are also closed.
E	416	724	587	All Wilderness and RNAs are closed. In the Desert scrub, grasslands and other sensitive areas, ORVs are restricted to roads and trails. Woodlands and coniferous forest are mostly open to off-road travel.

Exceptions to all Alternatives are limited to emergencies, specific permits, and special closures.

Table 3. Comparison of Issue Resolution by Alternative (continued)

Issue #2: Wilderness

Alternative	Quantifiable Comparison - All Periods Wilderness (FS Acres)	(BLM Acres)	Non-quantifiable Comparison
PA	401,190	640	Recommends 62,000 Acres for Mt. Graham Wilderness and 640 acres for BLM addition to Galiuro Wilderness. Recreation management including trail maintenance is concentrated in high use areas. A more primitive experience with low management intensity is emphasized in low use areas.
A	339,190	0	No new wilderness recommendations. All Wilderness Study Areas are managed to protect wilderness values. Only minimal recreation management is provided in all areas.
B	339,190	0	No new wilderness recommendations. Wilderness Study Areas will be managed for other resource uses. Recreation management intensity is moderate to high in all areas.
C	423,718	13,494	Recommends 11,034 Acres for Bunk Robinson Wilderness, 62,000 Acres for Mt. Graham Wilderness, and 11,494 Acres for Whitmire Canyon Wilderness. Recommends 2,553 acres for Baker Canyon, 6,156 Acres for Bowie Mountain, 640 Acres for BLM Galiuro, and 4,145 Acres for Guadalupe Canyon. Management intensity same as B.
D	429,990	14,420	Recommends 15,960 Acres for Bunk Robinson Wilderness, 62,000 Acres for Mt. Graham Wilderness, and 12,840 Acres for Whitmire Canyon Wilderness. Recommends 4,812 Acres for Baker Canyon, 6,156 Acres for Bowie Mountain, 640 Acres for BLM Galiuro, and 2,812 Acres for Guadalupe Canyon. Recreation management intensity is same as PA.
E	412,224	7,338	Recommends 11,034 Acres for Bunk Robinson Wilderness and 62,000 Acres for Mt. Graham Wilderness. Recommends 2,553 Acres for Baker Canyon, 640 Acres for BLM Galiuro and 4,145 Acres for Guadalupe Canyon. Management intensity same as B.
All			Under all alternatives wildernesses will be managed for a variety of uses compatible with the Wilderness Act and land capability. Range management intensity and livestock grazing opportunities will remain virtually the same under the PA and all alternatives.

Table 3. Comparison of Issue Resolution by Alternative (continued)

Alternative	Issue #3: Cultural Resources Interpretations Quantifiable Comparison	Non-quantifiable Comparison
PA		Opportunities for interpreting cultural resources are identified with specific project planning. Signing is emphasized at developed recreation sites. Interpretive information on historic sites is compiled and made available based on local interest and historical significance. Off-site interpretation is preferred. Current condition of Ft. Rucker is maintained. Enhance its usage for historical interest and evaluate need for structural improvements. Interpretive information used at Reef Campground facility.
A		Opportunities for interpreting cultural resources are identified with specific project planning. Existing interpretive signs are maintained. Allow Ft. Rucker to deteriorate at a normal rate. Protect from vandalism, but no preservation efforts.
B		Same as PA except greater emphasis on structural improvement of Ft. Rucker.
C		Same as B.
D		Same as B.
E		Same as PA.

Table 3. Comparison of Issue Resolution by Alternative (continued)

Issue #4: Wildlife
Threatened & Endangered Species
Critical Habitats

Quantifiable Alternative	Comparison in Periods 1 and 5 Direct Habitat Improvement Average Annual MAcre Equivalents Period 1	Period 5	Non-Quantifiable Comparison
			All alternatives will result in compliance with the Endangered Species Act and support for the State Game and Fish Departments and the U. S. Fish and Wildlife Service in their efforts to recover T&E Species.
PA	12.2	13.2	Habitats will be manipulated primarily through fuelwood harvest and range management practices. Some habitat improvement work would be directly funded. Increased emphasis on special interest and peripheral species. Moderate emphasis on T&E recovery.
A	8.8	8.8	Emphasis on maintenance of habitat for most species. Moderate emphasis on T&E recovery.
B	5.5	5.5	Lowest emphasis on non-game and T&E Species. Recovery of habitat would be slow with strong commodity emphasis.
C	42.3	43.4	Strong emphasis on game with increased emphasis on non-game, peripheral, special interest, and T&E Species.
D	20.8	20.8	Strongest emphasis on non-game, special interest, and T&E Species.
E	17.2	17.2	Increased emphasis on game and T&E Species.

Table 3. Comparison of Issue Resolution by Alternative (continued)

Issue #5: Range Management

Alternative	Quantifiable Comparison in Periods 1 and 5								Non-quantifiable Comparison
	Average Annual permitted use (MAUM) 2/		Range Management Intensity 1/ at end of Period 5 (MAcres)						
	Period 1	Period 5	A	A/D	B	C	D	E	
PA	350	360	215.9	45.1	397.0	306.7	761.8	0	Reduction in permitted livestock use occurs gradually over two periods as use and grazing capacity are balanced by reducing number and increasing capacity through intensified management and range improvement investments. Impacts on permittees are moderated as a result of the gradual reduction in use and significant increases in capacity. Long term range productivity improves as increased ground cover and management decrease erosion. Nearly all suitable acres are grazed except for presently ungrazed wilderness and small acreages of special areas.
A	350	370	217.9	43.1	231.7	135.5	1098.3	0	Not significantly different from PA.
B	357	406	199.7	23.3	133.9	134.2	155.8	1079.6	Balance between capacity and use achieved early in second decade. Long term productivity enhanced by significant investment in intensive range management. Impacts on permittees are minimized. Long term productivity improves as increased ground cover and management reduce erosion. Maximizes the use of suitable lands for grazing.
C	353	376	230.9	6.0	221.5	1158.3	109.8	0	Capacity and use are balanced in the second period. Emphasis on economic efficiency results in a moderate level of grazing. Less use of suitable grazing lands.
D	352	372	238.8	11.8	336.1	1106.0	33.8	0	Not significantly different from C.
E	353	377	229.8	52.3	203.5	650.7	590.2	0	Capacity and use are balanced in the second period. The more intensive management is concentrated on the most productive lands.

1/ See Glossary, page 189, for a definition of management levels.

2/ MAUM - Thousands of animal unit months. See Glossary, page 176.

Table 3. Comparison of Issue Resolution by Alternative (continued)

Issue #6: Timber and Forest Products

Alternative	Quantifiable Comparison - Periods 1 & 5 Product	Period	Average Annual Production	Non-quantifiable Comparison
PA	Timber	1	576 MCF [1/]	More aggressive management of suitable timber lands will insure a future variety of age classes, including old growth, to enchance visual resources and wildlife habitat. Fuelwood will be available on a sustained basis from suitable lands.
		5	576 MCF	
	Fuelwood	1	212 MCF	
		5	230 MCF	
A	Timber	1	430 MCF	Salvage/sanitation harvest in timber stands will not improve wildlife habitat or visual quality. Tree health and vigor will decline over time due to dense stands and insect and disease problems. Fuelwood will be available on a sustained basis from suitable lands.
		5	430 MCF	
	Fuelwood	1	234 MCF	
		5	238 MCF	
B	Timber	1	715 MCF	Timber and fuelwood stands will be managed to provide for maximum livestock forage. Timber and fuelwood will be harvested to reach desired stand density by Period 5 after which yield will drastically decline.
		5	1,339 MCF	
	Fuelwood	1	345 MCF	
		5	359 MCF	
C	Timber	1	0	No timber harvest will result in deterioration of the stands along with reduced quality and reduced diversity of wildlife habitat. Harvest of only the currently accessible fuelwood stands will cause a decline in fuelwood by Period 5.
		5	0	
	Fuelwood	1	194 MCF	
		5	94 MCF	
D	Timber	1	420 MCF	Timber harvest same as Alternative A. Harvest of only those fuelwood areas with existing access causes a decline in fuelwood by Period 5.
		5	420 MCF	
	Fuelwood	1	196 MCF	
		5	103 MCF	
E	Timber	1	469 MCF	Managing for lower density, unevenaged timber stands will result in improvement of visual quality and wildlife habitat but not to the extent PA does. Fuelwood will be on a sustained basis from suitable lands.
		5	469 MCF	
	Fuelwood	1	252 MCF	
		5	250 MCF	

[1/] MCF - Thousands of cubic feet. See Glossary, page 178.

Table 3. Comparison of Issue Resolution by Alternative (continued)

Alternative	Issue #7: Plant and Animal Diversity Non-quantifiable Comparison
PA	Riparian dependent species will be featured through application of proper grazing systems and silvicultural practices. A moderate level of vegetation manipulation is proposed for wildlife and livestock forage, and through timber harvest. No significant change in diversity is anticipated. Use of introduced species for revegetation varies between management areas.
A	Same as PA.
B	Extensive vegetation manipulation is planned. Trend will be toward more herbaceous plants and less woody plants. There will be wide spread use of introduced plant species. Riparian areas will be managed through grazing systems, silvicultural practices, and revegetation. Wildlife diversity will decrease overall.
C	Diversity in coniferous forest areas will decline due to lack of stand management. Elsewhere there will be no significant change in diversity. There will be very little use of introduced plant species.
D	Some decline in vegetative diversity may occur due to a lack of control of invading plants. Trend will be toward more woody species and less herbaceous cover. Wildlife diversity will decrease proportionately. There will be little or no use of introduced plant species. Riparian areas will be improved through exclusion of grazing and other disturbing activities.
E	Same as PA.

Table 3. Comparison of Issue Resolution by Alternative (continued)

Alternative	Issue #8: Soil and Water Watershed Condition Quantifiable comparison - Period 5 Satisfactory Watershed Acres (MAcres)	Non-quantifiable Comparison
PA	1317	Balancing permitted livestock use with capacity in the second period, improved range management intensity, moderate direct watershed treatments and some road reconstruction result in increased ground cover and infiltration of water. Some reduction in soil loss occurs as sheet erosion and head cutting are reduced. Long-term productivity of all related resources is protected.
A	1231	Although permitted use and capacity are balanced in the second period range management intensity fails to increase. This coupled with low levels of direct watershed improvement perpetuates loss of soil at current rates and results in reduced long-term productivity of soils and related resources in some areas.
B	1507	Balancing permitted use with capacity in the second period, improved range management intensity, high direct watershed treatments and some road reconstruction result in increased ground cover and a high reduction in soil loss. Long-term productivity of all related resources is protected and enhanced.
C	1406	Balancing permitted use with capacity in the second period, improved range management intensity, moderate direct watershed treatment and some road reconstruction result in increased ground cover and some reductions in soil loss. Long-term productivity of soil and related resources is protected.
D	1383	Balancing permitted use and capacity in the second period, improved range management intensity, moderate direct watershed treatments, and moderate road reconstruction result in increased ground cover and moderate reductions in soil loss. Long-term productivity of all related resources is protected.
E	1373	Same as C but soil loss is reduced due to moderate direct watershed treatment. Long-term productivity of all related resources is protected.

Table 3. Comparison of Issue Resolution by Alternative (continued)

Issue #9: Minerals Management

Alternative	Quantifiable Comparison - All Periods: Locatable Restrictions (Acres)	Locatable Withdrawals (Acres)	Leasable Restrictions (Acres)	Leasable Withdrawals (Acres)	Plans Per 1	Plans Per 5	Non-Quantifiable Comparison
PA	23,411	420,019	41,890	401,190	281	398	Mineral activity will be relatively unaffected regardless of the alternatives selected. There will be slight variation between alternatives in the acreage of recommended mineral withdrawals and areas withdrawn from mineral leasing. Few of those acreage differences are in areas of probable mineral potential (See Table 32). The primary exceptions are Bunk Robinson and Whitmire Canyon WSAs which are classified as theoretically favorable for prospecting for locatable minerals and the proposed Cave Creek ZBA (Alternative D) which is theoretically favorable for geothermal prospecting. In addition, there will be some variation in the acres which will have restrictions on locatable and leasable mineral development. Areas already withdrawn or to be recommended for withdrawal from mineral entry include developed recreation sites, administrative sites, other areas needed to protect expensive developments, research natural areas, and zoological-botanical areas. The review of existing withdrawals is scheduled to be completed in the near future. Subject to valid rights existing prior to December 31, 1983 or August 28, 1984, all wilderness areas are withdrawn from mining and mineral leasing.
A	114,211	353,444	37,665	429,990	281	398	
B	23,411	356,712	40,583	339,190	281	398	
C	23,411	441,332	41,025	423,718	281	398	
D	23,411	486,729	78,205	429,900	281	398	
E	23,411	427,319	38,506	412,224	281	398	

Table 3. Comparison of Issue Resolution by Alternative (continued)

Issue #10: Lands
Landownership

Alternative	Quantifiable Comparison - All Periods				Non-quantifiable Comparison
	Acres Base for Exchange	Acres Desirable for Acquisition	Acres per Period Purchase	Acres per Period Exchange	
PA	36,353	41,661	100	3,200	Generally lands would be acquired or exchanged to consolidate land patterns to facilitate better management of resources. Additional lands would be purchased to meet specific National Forest objectives such as additional recreation sites or for special wildlife habitat. The difference between alternatives is the rate of acquisition planned.
A	33,330	42,125	20	3,200	
B	33,853	41,661	50	3,200	
C	36,353	41,661	100	3,200	
D	36,353	41,661	200	3,200	
E	33,853	41,661	100	3,200	

Table 3. Comparison of Issue Resolution by Alternative (continued)

Issue #11: Special Areas
Research Natural Areas (RNAs)

Alternative	Quantifiable Comparison - All Periods		Non-quantifiable Comparison
	No. of RNAs	Total Acres	
PA	8	5,655	Continue existing RNAs. Enlarge Pole Bridge RNA to include a representative stand of Chihuahua Pine. Reduce the Santa Catalina RNA to avoid conflicts with the intent of the RNA System. Add Canelo and Sycamore Canyon extension of Goodding area to the RNA System.
A	6	6,986	Continue present RNAs. No additions or deletions to RNA System.
B	7	4,185	Continue existing RNA,s but enlarge Pole Bridge RNA and reduce the size of Santa Catalina RNA. Add Canelo area and Sycamore Canyon extension to the RNA System.
C	6	3,745	Continue existing areas but reduce the size of the Santa Catalina RNA.
D	14	15,575	Continue existing areas and enlarge Pole Bridge RNA. Add Canelo, Sycamore extension, Scotia, Sunnyside, Lochiel, Pine Canyon, Upper Guadalupe Canyon, and Research Ranch to the RNA System.
E	6	3,745	Continue existing areas but reduce the size of Santa Catalina RNA.

Table 3. Comparison of Issue Resolution by Alternative (continued)

Issue #11: Special Areas
Zoological-Botanical Areas (ZBAs)

Alternative	Quantifiable Comparison - All Periods: Number of Areas	Quantifiable Comparison - All Periods: Acres	Non-quantifiable Comparison
PA	2	4,240	Recommends a Zoological-Botanical Area (762 acres) in the South Fork, excluding a corridor ten feet from each side of the road, the recreation site, and the existing summer homes. Vehicle access to summer homes and the existing recreation site would remain. Recommends a Zoological Area in Guadalupe Canyon.
A	0	0	No change from current management.
B	1	168	Recommends a ZBA upstream from the South Fork Campground, with no change in management below the campground.
C	1	800	Recommends a ZBA in South Fork, with public vehicle access prohibited and the campground converted to day use only. Access would be provided to summer home owners and handicapped users. Arizona Game & Fish would be asked to prohibit hunting and trapping.
D	7	36,740	Recommends ZBA for entire watershed of South Fork. Would include main Cave Creek in ZBA designation. Recommends ZBAs in Clanton Draw, O'Donnell Creek, Ramsey Canyon, Guadalupe Canyon, and Pine-Ramanote. Grazing excluded in all ZBAs.
E	0	0	No change from current management.

Table 3. Comparison of Issue Resolution by Alternatives (continued)

Alternative	Travelways closed (miles)	Total road ROW acquired (miles) and percent of needed ROW	Total road and trail construction/ reconstruction (miles) Trails	Roads	Average annual road system management by maintenance levels (miles) 1/ Levels 1 - 2	3 - 5	Non-quantifiable Comparison
	Issue #13: Facilities Roads and Trails						
	Quantifiable Comparison - Period 5						
PA	100	100(10%)	147	400	2076	640	Moderate levels of road construction and maintenance to reduce loss of investment in the road system. Miles of system roads will be adequate for future needs. Right-of-way acquisition is low and may result in some loss of access.
A	100	92(9%)	147	350	2125	591	Low levels of road construction and maintenance continue present disinvestment in the road system. Right-of-way acquisition is below anticipated needs and may result in loss of access.
B	100	208(21%)	147	850	1800	916	High level of construction and maintenance prevent loss of the road system investment. Right-of-way acquisition meets needs and will not result in loss of access in the future.
C	100	154(15%)	147	650	2076	640	Moderate level of construction and maintenance prevent loss of the road system investment. Right-of-way acquisition is below needs and will result in loss of access in the future.
D	100	133(13%)	147	550	2076	640	Moderate levels of construction and maintenance prevent loss of road system investment. Right-of-way is below needs and loss of access will result.
E	100	137(14%)	147	550	2076	640	Same as A except slightly higher levels of construction, maintenance, and travelway closure result in a moderately low rating in soil and water improvement. Right-of-way acquisition is below needs and will result in loss of access.

Table 3. Comparison of Issue Resolution by Alternatives (continued)

Alternative	Issue #14: Law Enforcement Non-quantifiable Comparison
PA	A moderate level of law enforcement financing, intensity and management direction will provide user protection in the high public use areas. It will improve the Forest's ability to prevent firewood and recreation fee theft, and illegal occupancy of land and campsites.
A	A low level of law enforcement financing, intensity and management direction will reduce the Forest's ability to prevent firewood and recreation fee theft, illegal occupancy of land and campsites and provide user protection.
B	A high level of law enforcement financing, intensity and management direction will provide ability to extend adequate resource and user protection to most of the Forest. The Forest's ability to prevent recreation fee theft and illegal occupancy of campsites will improve. Visibility of officers and ability to prosecute violators will enhance perception of enforcement responsibility.
C	Same as B.
D	Same as B.
E	Same as B.

Table 3 shows that the Proposed Action and each alternative addresses issues in different ways and provides resolution at different levels, therefore, a composite evaluation is difficult.

The PA and all alternatives resolve the concern of livestock use that is in excess of capacity by the end of the second period. The difference between alternatives is the difference in range management intensity and the ultimate levels of use. The PA and all alternatives, except A, make significant improvements in watershed condition by the end of the fifth period. All riparian areas will be in satisfactory condition by the fifth period in the PA and all alternatives.

Alternative A, which projects a continuation of current management, provides the least resolution of issues, in particular the recreation and wilderness issues.

Alternative B addresses developed and dispersed recreation and improved range and watershed condition at high levels. This results in a very high cost and is accomplished at the expense of additional wilderness and wildlife opportunities.

Alternative C gives emphasis to recreation opportunities and wildlife habitat while giving less emphasis to managing forest and woodland stands and producing wood fiber on a sustained basis.

Alternative D emphasizes high levels of wilderness opportunity and maintaining natural processes and conditions. A reduction in direct resource management practices results in future reductions of some resource opportunities such as harvest of wood products.

Alternative E attempts to sustain a mix of resource uses and opportunities in order to address all issues while not giving special emphasis to any one issue.

The Proposed Action attempts to deal with basic resource concerns first (range, watershed, and riparian conditions) and then resolve other issues at levels commensurate with providing multiple resource opportunities under a constrained budget.

Acres Available

Because alternatives result in different combinations of management prescriptions and different assignments of acreage to management prescriptions, there are differences between alternatives in total acreage available for timber harvest, livestock grazing, developed recreation sites, and minerals exploration and development.

Table 4. Acreage Available by Alternative

Alternative	Timber Harvest	Livestock Grazing	Developed Recreation	Minerals [1/] Exploration & Development	
				Locatable	Leasable
PA	13,729	1,510,500	4,165	1,306,495	1,325,324
A	14,558	1,508,600	3,990	1,373,070	1,296,524
B	14,268	1,526,800	6,740	1,369,802	1,387,324
C	0	1,495,600	6,740	1,285,182	1,302,796
D	14,294	1,487,700	5,021	1,239,785	1,296,614
E	14,294	1,496,700	5,021	1,299,195	1,314,290

[1/] See Tables 63 and 64 for restrictions on some of the available acres.

There are significant variations in the acreage of land available for timber harvest and developed recreation between the alternatives. The variation in acreage available for livestock grazing and minerals exploration and development varies between some of the alternatives, but the differences are less significant than for timber harvest and developed recreation.

Harvest Method Acreage

While Table 4 shows the total acreage available for timber harvest in each alternative, the method of timber harvest is often of more interest than the total acreage available. The influence on the environment often varies more between methods of harvest than between harvesting and not harvesting.

Table 5. Average Annual Acres of Timber Harvest Methods for Period 1

Alternatives	Shelterwood Tractor	Clear Cut Tractor	Selection Tractor
PA	275	4 1/	408
A	0	0	728
B	618	38 2/	0
C	0	0	0
D	0	4 1/	711
E	0	4 1/	711

1/ 40 acres per period of aspen management.
2/ Spruce-fir clearcuts for forage production.

Alternatives PA, A, D, and E provide a sustained, non-declining timber yield. Alternative C provides no timber harvest. The objective for timber harvest in Alternative B is to maximize livestock forage and grazing use. The result is an erratic timber yield.

Wilderness Study Areas

The Forest contains 90,800 acres of Wilderness Study Areas (WSA) in three parcels. These were established by the 1984 Arizona Wilderness Act (PL 98-406) and the 1980 New Mexico Wilderness Act (PL 96-550). In addition, the Bureau of Land Management (BLM) has three Wilderness Study Areas (WSAs) contiguous to the Forest Service administered Study Areas and one contiguous to a former study area. Each alternative proposes different amounts and combinations of wilderness study areas to be recommended for wilderness designation. Table 6 shows acres assigned to wilderness and nonwilderness uses. Table 7 shows specific management emphasis and intensity assignments for Forest Service administered areas only.

Recommendations in the Proposed Action are preliminary administrative recommendations that will receive further review and possible modification by the Chief of the Forest Service, the Director of the Bureau of Land Management, the Secretaries of Agriculture and Interior, and the President of the United States. Final decisions on wilderness and nonwilderness designations have been reserved by the Congress to itself. Until Congress makes a decision regarding management direction, all WSAs will be managed to maintain the existing wilderness character and potential for inclusion in the National Wilderness Preservation System.

Table 6. Wilderness Study Areas Proposed for Wilderness by Alternative

Study Area	Total Acres	Alternatives (Acres) PA	A	B	C	D	E
Forest Service Administered Lands							
Bunk Robinson	15,960	0	0	0	11,034	15,960	11,034
Mt. Graham	62,000	62,000	0	0	62,000	62,000	62,000
Whitmire Canyon	12,840	0	0	0	11,494	12,840	0
Total Wilderness Acres		62,000	0	0	84,528	90,800	73,034
Percent of Total Study Areas		68%	0%	0%	93%	100%	80%
Total Non-Wilderness Acres		28,800	90,800	90,800	6,272	0	17,766
Percent of Total Study Areas		32%	100%	100%	7%	0%	20%

Table 6. Wilderness Study Areas Proposed for Wilderness by Alternative (Continued)

Study Area	Total Acres	Alternatives (Acres) PA	A	B	C	D	E
Bureau of Land Management Administered Lands							
Baker Canyon	4,812	0	0	0	2,553	4,812	2,553
Bowie Mountain	6,156	0	0	0	6,156	6,156	0
BLM Galiuro	640	640	0	0	640	640	640
Guadalupe Canyon	4,145	0	0	0	4,145	2,812	4,145
Total Wilderness Acres		640	0	0	13,494	14,420	7,338
Percent of Total Study Areas		4%	0%	0%	86%	92%	47%
Total Non-Wilderness Acres		15,113	15,753	15,753	2,259	1,333	8,415
Percent of Total Study Areas		96%	100%	100%	14%	8%	53%

Table 7. Wilderness Study Area Acreage By Management Emphasis and Intensity For Each Alternative (Forest Service Administered Lands Only)

Management Emphasis	Management Intensity	Acres By Alternative PA	A	B	C	D	E
Wilderness	Low	31,729	0	0	0	0	0
	High	30,271	0	0	84,528	90,800	73,034
Wilderness Study	Moderate	0	90,800	0	0	0	0
Livestock (level D)/ Game/Fuelwood	Moderate	0	0	0	0	0	0
	High	25,049	0	24,099	0	0	14,789
Game/Livestock (level C)/ Fuelwood	High	0	0	0	6,272	0	2,704
Unique	Moderate	0	517	0	0	0	
	High	0	358	0	0	0	
Zoological Area	High	3,478	0	0	0	(3,530)[1/]	0
Research Natural Area	High	0	0	0	0	(1,540)[1/]	
Semi-primitive Recreation	High	273	0	13,435	0	0	273
Livestock (level E)	Maximum	0	0	52,391	0	0	0
Total Wilderness		62,000	0	0	84,528	90,800	73,034
Total Non-wilderness		28,800	90,800	90,800	18,870	0	17,766

[1/] Acres included in wilderness acres shown above.

In Alternative A (current) the FS and BLM WSAs would be managed to protect their wilderness values although there would be no official wilderness designation.

Chapter 4 summarizes the resource tradeoffs between a wilderness or nonwilderness designation for each WSA. More detail can be found in Technical Reports available at Forest Service and Bureau of Land Management Offices.

Resource Outputs

One of the main differences between alternatives is the outputs produced. The magnitude and mix of outputs determine the effect each alternative has on issues and the impacts on the environment. The level of outputs determines the costs and benefits of the alternatives. Table 8 shows the outputs of each alternative by time period. Outputs for the low intensity, maximum PNV, maximum wildlife, and maximum range benchmarks are shown so that the alternatives can be viewed in context with the low and high levels of possible output.

Table 8. Resource Outputs by Alternatives and Selected Benchmarks

Output	Alternative						Benchmark			
	PA	A	B	C	D	E	Low Intensity	MAX PNV Assigned	MAX Wildlife	MAX Range
Developed Recreation	Thousand Recreation Visitor Days Per Year (MRVD)									
Period 1	1317	1287	1547	1547	1435	1435	1299	1547	1547	1547
2	1451	1395	1910	1911	1687	1687	1318	1911	1910	1910
3	1508	1427	2198	2198	1865	1865	1210	2198	2198	2198
4	1540	1434	2460	2460	2010	2010	999	2460	2460	2460
5	1565	1435	2715	2715	2152	2152	640	2715	2715	2715
Other Dispersed Recreation	Thousand Recreation Visitor Days Per Year (MRVD)									
Period 1	815	839	856	801	818	801	776	808	842	808
2	994	1024	1044	977	998	977	946	985	1027	986
3	1211	1246	1271	1190	1215	1190	1152	1199	1251	1200
4	1477	1521	1550	1451	1481	1451	1407	1462	1525	1464
5	1798	1852	1888	1767	1804	1767	1712	1781	1858	1783
Other Wilderness Recreation	Thousand Recreation Visitor Days Per Year (MRVD)									
Period 1	343	260	290	361	368	362	288	357	314	356
2	419	317	354	440	449	441	352	436	383	434
3	510	387	431	536	547	537	428	531	467	529
4	622	472	526	654	667	655	523	648	569	645
5	758	575	641	797	813	798	637	789	694	786
Wildlife Recreation 1/	Thousand Recreation Visitor Days Per Year (MRVD)									
Period 1	330	324	326	349	331	339	269	349	356	335
2	389	384	363	415	396	402	282	416	425	386
3	461	450	428	497	474	478	334	498	510	458
4	550	534	508	590	562	568	401	591	605	543
5	646	626	602	698	665	672	474	699	715	643
Grazing Capacity	Thousand Animal Unit Months Per Year (MAUM)									
Period 1	333	334	348	335	334	336	306	335	335	348
2	340	344	372	346	344	347	295	346	345	372
3	348	354	393	356	354	358	286	356	355	393
4	355	363	402	366	363	371	278	366	365	402
5	360	370	406	376	372	377	274	376	374	406

Table 8. Resource Outputs by Alternatives and Selected Benchmarks (Continued)

Output	Alternative						Benchmark			
	PA	A	B	C	D	E	Low Intensity	MAX PNV Assigned	MAX Wildlife	MAX Range
Permitted Use	Thousand Animal Unit Months Per Year (MAUM)									
Period 1	350	350	357	353	352	353	327	353	353	357
2	338	341	370	344	343	344	296	344	344	370
3	344	351	393	352	349	354	281	352	350	393
4	354	363	402	366	363	371	277	366	365	402
5	360	370	406	376	372	377	274	376	374	406
Net Sawtimber	Thousand Cubic Feet Per Year (MCF)									
Period 1	576	430	715	0	420	469	75	0	0	715
2	576	430	1048	0	420	469	75	0	0	1048
3	576	430	1161	0	420	469	75	0	0	1161
4	576	430	1264	0	420	469	75	0	0	1264
5	576	430	1339	0	420	469	75	0	0	1339
Net Sawtimber	Thousand Board Feet Per Year (MBF)									
Period 1	2880	2150	3575	0	2100	2345	375	0	0	3575
2	2880	2150	5240	0	2100	2345	375	0	0	5240
3	2880	2150	5805	0	2100	2345	375	0	0	5805
4	2880	2150	6320	0	2100	2345	375	0	0	6320
5	2880	2150	6695	0	2100	2345	375	0	0	6695
Fuelwood	Thousand Cubic Feet Per Year (MCF)									
Period 1	212	234	345	194	196	252	0	198	199	314
2	220	227	350	183	186	253	0	188	188	310
3	233	241	359	139	145	259	0	142	137	305
4	231	239	359	94	103	251	0	95	84	293
5	230	238	359	94	103	250	0	95	85	293
Total Water Yield	Thousand Acre-feet Per Year (MAc. Ft.)									
Period 1	146	146	146	146	146	146	146	146	146	146
2	146	146	146	146	146	146	146	146	146	146
3	146	146	146	146	146	146	146	146	146	146
4	146	146	146	146	146	146	146	146	146	146
5	146	146	146	146	146	146	146	146	146	146
Satisfactory Watershed Condition	M acres									
Period 1	1197	1191	1216	1206	1204	1206	1191	1206	1204	1216
(end 2	1218	1197	1278	1248	1240	1243	1197	1248	1240	1278
of 3	1251	1208	1335	1300	1288	1286	1208	1300	1288	1355
Period) 4	1284	1219	1431	1353	1336	1320	1219	1353	1336	1431
5	1317	1231	1507	1406	1384	1373	1231	1406	1384	1507

1/ Includes hunting, fishing, and nongame use.

Costs

Costs of implementing the alternatives and selected benchmarks for all of the time periods are shown in Table 9. Benchmarks were included so the alternatives can be viewed in perspective. The benchmarks do not contain all constraints that were applied to alternatives to make them financially and legally feasible.

Table 9. Average Annual Cost by Alternatives and Selected Benchmarks

	M Dollars Per Year									
	Alternative						Benchmark			
	PA	A	B	C	D	E	Low Intensity	MAX PNV Assigned	MAX Wildlife	MAX Range
Budget to Implement 1/										
Period 1	5997	5751	12628	9653	8402	8639	4044	9659	9710	11575
2	6076	5897	12991	9792	8575	8849	4074	9799	9848	11866
3	6030	5908	12821	9712	8509	8818	3972	9716	9759	11736
4	5978	5886	12626	9625	8443	8758	3949	9627	9667	11586
5	6033	5907	12713	9715	8561	8870	3922	9714	9749	11679
O&M Except Roads										
Period 1	5254	5298	9639	7026	6877	6879	3779	7025	7076	8586
2	5333	5444	10002	7165	7050	7089	3809	7165	7214	8877
3	5287	5455	9832	7085	6984	7058	3707	7082	7125	8747
4	5235	5433	9637	6998	6918	6998	3684	6993	7033	8597
5	5290	5454	9724	7088	7036	7110	3657	7080	7115	8690
O&M Roads										
Period 1	509	394	1082	718	650	885	265	725	725	1082
2	509	394	1082	718	650	885	265	725	725	1082
3	509	394	1082	718	650	885	265	725	725	1082
4	509	394	1082	718	650	885	265	725	725	1082
5	509	394	1082	718	650	885	265	725	725	1082
Capital Investment Except Roads & Facilities										
Period 1	105	0	1650	1650	619	619	0	1650	1650	1650
2	105	0	1650	1650	619	619	0	1650	1650	1650
3	105	0	1650	1650	619	619	0	1650	1650	1650
4	105	0	1650	1650	619	619	0	1650	1650	1650
5	105	0	1650	1650	619	619	0	1650	1650	1650
Capital Investment Roads & Facilities Construction/ Reconstruction 2/										
Period 1	129	59	257	259	256	256	0	259	259	257
2	129	59	257	259	256	256	0	259	259	257
3	129	59	257	259	256	256	0	259	259	257
4	129	59	257	259	256	256	0	259	259	257
5	129	59	257	259	256	256	0	259	259	257
Total Costs 3/										
Period 1	7396	7278	14187	11013	9811	10056	5642	11020	11070	13134
2	7476	7424	14549	11152	9984	10265	5672	11159	11208	13424
3	7429	7435	14380	11072	9918	10235	5571	11076	11120	13294
4	7378	7414	14185	10986	9852	10175	5548	10987	11028	13144
5	7432	7435	14271	11075	9970	10286	5521	11074	11110	13238

1/ Does not include Fire Fighting Fund (FFF) or Purchaser Credit or non-Forest Service costs.

2/ Does not include Timber Purchaser Credit.

3/ Total costs include all Forest Service and non-Forest Service cost.

Benefits

Table 10 shows the average annual resource benefits for the major resources having benefit values for the alternatives and selected benchmarks. The values displayed are undiscounted benefits for each of the first five ten-year time periods. This data is useful to evaluate trends over time in resource production and value. Table 10 also contains data on receipts to the U.S. Treasury, the distribution of revenue to the states, and employment and income generated by each alternative.

Mineral and water benefits are not reported in Table 10 because they were calculated to be the same for all alternatives and do not affect the evaluation of alternatives based on benefits derived or present net value. Returns to the Treasury as a result of these resources were also not included for the same reason.

The benchmarks are included so the alternatives can be viewed in perspective. The benchmarks do not contain all the constraints that were applied to the alternatives.

Table 10. Resource Benefits by Alternatives and Selected Benchmarks

Benefits		Alternative						Benchmark		
		PA	A	B	C	D	E	Low Intensity	MAX PNV Assigned	MAX Wildlife	MAX Range
Recreation 1/ Benefits		Thousands of Dollars Per Year									
	Period 1	17634	13412	26723	26981	25997	26029	12627	27008	26863	27000
	2	20868	15558	32796	33111	31162	31198	14180	33143	32967	33132
	3	24293	17704	38835	39218	36337	36370	15465	39260	39045	39245
	4	28289	20207	45463	45928	42029	42077	16707	45976	45714	45960
	5	33042	23183	52956	53524	48657	48708	17705	53585	53265	53565
Wildlife 2/ Benefits		Thousands of Dollars Per Year									
	Period 1	6112	6019	6086	6529	6181	6287	5012	6539	6654	6282
	2	7206	7143	6782	7781	7379	7476	5251	7793	7943	7268
	3	8544	8391	8026	9336	8851	8908	6223	9352	9542	8640
	4	10178	9960	9513	11090	10512	10590	7481	11109	11329	10252
	5	12007	11674	11302	13127	12446	12540	8845	13148	13408	12158
Range Benefits		Thousands of Dollars Per Year									
	Period 1	4375	4387	4564	4399	4386	4412	4013	4399	4396	4547
	2	4468	4514	4885	4537	4517	4548	3876	4537	4527	4841
	3	4560	4642	5161	4677	4646	4696	3759	4677	4663	5088
	4	4654	4762	5274	4810	4768	4866	3648	4809	4791	5211
	5	4723	4848	5329	4928	4877	4952	3593	4927	4906	5282
Timber & Fuelwood Benefits		Thousands of Dollars Per Year									
	Period 1	107	82	135	5	79	89	13	6	6	134
	2	107	81	193	5	78	89	13	5	5	192
	3	108	82	213	4	77	89	13	4	4	212
	4	108	82	231	3	76	89	13	3	2	229
	5	107	82	244	3	76	89	13	3	2	242
Total Benefits		Millions of Dollars Per Year									
	Period 1	28.2	23.9	37.5	37.9	36.6	36.8	21.7	38.0	37.9	38.0
	2	32.6	27.3	44.7	45.4	43.1	43.3	23.3	45.5	45.4	45.4
	3	37.5	30.8	52.2	53.2	49.9	50.1	25.5	53.3	53.3	53.2
	4	43.2	35.0	60.5	61.8	57.4	57.6	27.8	61.9	61.8	61.7
	5	49.9	39.8	69.8	71.6	66.1	66.3	30.2	71.7	71.6	71.2

Table 10. Resource Benefits by Alternatives and Selected Benchmarks (Continued)

Benefits	Alternative						Benchmark			
	PA	A	B	C	D	E	Low Intensity	MAX PNV Assigned	MAX Wildlife	MAX Range
					Thousands of Dollars Per Year					
Receipts to U.S. Treasury										
Period 1	824	817	872	841	837	842	760	841	841	873
2	819	813	949	867	851	856	705	868	867	943
3	837	836	1030	915	882	896	664	915	912	1015
4	859	859	1081	971	924	944	632	971	969	1070
5	873	872	1121	1020	957	972	583	1020	1016	1112
					Thousands of Dollars Per Year					
Distribution to States 3/										
Period 1	206	204	218	210	209	211	190	210	210	218
2	205	203	237	217	213	214	176	217	217	236
3	209	209	258	229	221	224	166	229	228	254
4	215	215	270	243	231	236	158	243	242	268
5	218	218	280	255	239	243	146	255	254	278
					Number of Jobs					
Annual Employment										
Period 1	4992	4820	5291	5149	5062	5062				
2	5818	5532	6128	6099	5955	5955				
					Millions of Dollars					
Annual Income										
Period 1	71.7	69.4	76.6	74.0	72.7	72.7				
2	82.8	79.0	87.6	86.8	84.8	84.8				

1/ Includes developed, other dispersed, and other wilderness use.

2/ Includes hunting, fishing, and non-game use.

3/ This represents 25 percent of total returns to Government.

Present Net Value Analysis

Present net value (PNV) is the criterion used to maximize net priced benefits in planning benchmarks and alternatives. The priced outputs are those that are or can be exchanged in the market place or are based on data used to estimate the value of recreation visitor days (wildlife, wilderness, developed, and dispersed use), permitted livestock use, timber products and firewood, minerals, and water yield.

The alternatives are designed and analyzed to achieve goals and objectives for priced outputs in a manner that achieves the greatest excess in the value of priced outputs in relation to cost of production while meeting all specified constraints and objectives. The alternatives are also constrained to achieve any specified non-priced outputs or benefits and to meet constraints at least cost. The PNV of each alternative, therefore, estimates the value of the maximum attainable net benefits of priced outputs. PNV estimates the market value of resources after all costs of producing outputs and meeting constraints have been subtracted from the value of the expected flow of priced outputs.

Table 11 presents a display of the alternatives arranged in order of increasing present value of costs (PVC). The intent is to display what happens to PNV as PVC increases marginally from one alternative to the next. It is important to note the alternatives were not developed in order of increasing costs but are displayed in this fashion to provide a comparative analysis.

Table 11. Present Value Analysis (Millions of 1980 4th Quarter Dollars)

	Alternative						Max. PNV
	A	PA	D	E	C	B	Assigned
Present Value Benefits (PVB)	742.2	901.5	1188.7	1193.4	1262.0	1238.1	1263.3
Change Betw. Alt.		159.3	287.2	4.7	68.6	-23.9	25.2
Present Value Costs (PVC)	183.2	184.3	245.9	253.0	274.7	354.8	274.8
Change Betw. Alt.		1.1	61.6	7.1	21.7	80.1	-80.0
Present Net Value (PNV)	559.0	717.2	942.8	940.4	987.3	883.3	988.5
Change Betw. Alt.		158.2	225.6	-2.4	46.9	-104.0	105.2
PVB by Resource Category							
Timber/ Fuelwood	2.0	2.5	1.9	2.2	0.1	4.0	0.1
Recreation	424.9	581.4	861.9	862.8	924.7	915.5	925.6
Wildlife	201.6	205.4	211.0	213.3	222.6	195.8	223.0
Range	113.7	112.2	113.9	115.1	114.6	122.8	114.6
PVC by Major Budget Cost Category							
Timber/ Fuelwood	5.5	4.1	5.4	3.8	1.4	5.3	1.4
Recreation/ Wilderness	16.7	21.9	65.1	64.0	98.6	97.9	98.6
Wildlife	9.2	9.8	10.6	10.1	10.4	11.7	10.4
Range	19.6	18.4	16.2	18.0	16.2	20.6	16.2
Soil & Water	6.0	7.4	9.1	9.1	9.6	64.6	9.9
Road & Trail mtc. & const.	12.1	16.2	22.8	31.4	24.2	34.8	24.2
All Other	114.1	106.5	116.7	117.1	114.3	119.9	114.1

Table 11 presents and compares discounted priced benefits, discounted costs, and the present net value of the alternatives, arranged in increasing order of total investment and operating costs. With the exception of Alternatives E and B (RPA) both total discounted priced benefits and PNV increase as total cost increases.

The negative PNV change between Alternative E and D is insignificant. Alternative E has higher benefits due to increased recreation opportunities, however, these are offset by increased road maintenance and construction costs needed to increase management activities in coniferous forest and woodland stands to maintain their vigor. This results in an increase in opportunities for timber and fuelwood harvest which are not cost effective uses when priced only as wood fiber.

The negative PNV change between Alternative B (RPA) and C is caused largely by the significant increases in the cost of soil and water management and road and trail maintenance and construction. These increased expenditures are needed to sustain the very high levels of management activity (see other costs) needed to meet RPA goals for livestock grazing and recreation opportunities while protecting other resources. Soil and water investment costs are high because of the great number of direct watershed treatment acres. The treatment costs per acre are higher than the other alternatives because many acres are in the limited opportunity class for improvement. The increased road and trail maintenance and investment costs are

needed to sustain the improved watershed condition while supporting the high level of management activity. The increased costs result in significant improvement in watershed condition which is largely a nonpriced benefit except as it helps to sustain the production of various resource outputs.

The significant increases in benefits from Alternatives A and PA to D and E and then again from D and E to C and B is due primarily to significant increases in developed recreation opportunities which is reflected by similar increases in recreational investments.

Range management costs increase and decrease with corresponding increases or decreases in the activity and resulting levels of output. Benefit changes are insignificant except for Alternative B where the increase is only slightly greater than the other alternatives. Monetary benefits to taxpayers, as reflected by receipts to the Treasury and payments to counties in lieu of taxes (Table 10) are lower for the lower recreation oriented alternatives. However, the differences between all alternatives is insignificant.

PRESENT NET VALUE TRADE-OFFS

Table 12 displays the ranking of the alternatives against the Max PNV Assigned Value benchmark. The alternatives rank in the order of decreasing PNV from left to right. The comparisons are in millions of 1980 4th Quarter Dollars discounted at 4 percent.

Table 12 also shows quantifiable nonpriced benefits from management practices which have costs but do not have assigned benefit values. This causes a trade-off in PNV. The only significant quantifiable nonpriced benefit is acres of improved watershed condition. Some alternatives have significantly higher watershed improvement costs causing corresponding trade-offs in PNV. There are other minor trade-offs caused by nonquantifiable nonpriced benefits.

Nearly all of the trade-offs in PNV between alternatives is because of changes in priced outputs to achieve the objectives of individual alternatives and to meet budget constraints to insure financial feasibility.

Table 12. Comparison of Alternatives with Max PNV Assigned Benchmark and Nonpriced Benefits Affecting Change in PNV.

	Max PNV	Alternative					
	Assigned	C	D	E	B	PA	A
MM$	988.5	987.3	942.8	940.4	883.3	717.2	559.0
Change Betw. Alt. MM$		-1.2	-44.5	-2.4	-57.1	-166.1	-158.2
Percent of Max PNV Assigned	100	99.9	95.4	95.1	89.4	72.6	56.6
Nonpriced Benefits Improved Watershed Condition - M Acres	214.2	214.2	192.2	181.6	315.6	126.1	39.4

The difference in PNV from one alternative to the next is called the opportunity cost of that alternative. The opportunity cost is a measure of the economic efficiency foregone (change in PNV) to achieve the objectives of that alternative instead of the objectives of the next higher ranked alternative.

Alternatives differ in the amount of priced and nonpriced costs and benefits produced to meet the objectives of each alternative. One of the biggest factors

causing a trade-off between alternatives is the budget constraint to insure financial feasibility. Only alternatives A and PA were subject to budget constraints.

The following discussion highlights the major opportunity costs of each alternative compared to the alternative with the next highest PNV.

Maximize Present Net Value Benchmark

The PNV of this benchmark is used as a reference point for evaluating opportunity costs between alternatives. This benchmark achieves the highest PNV because the objective was to maximize economic efficiency with the least number of constraints to meet resource objectives. The only constraints on the benchmark were those needed to meet minimum policy and legal requirements common to all benchmarks and alternatives. The benchmark maximizes recreation outputs which provide the greatest contribution to net priced benefits. Timber and fuelwood output is minimized because these outputs result in negative net benefits. Grazing outputs contribute to net benefits up to a certain point and are produced at moderate levels. See Appendix B for complete details on constraints used in benchmarks and alternatives.

Alternative C

This alternative is a slight modification of the Max PNV benchmark. The primary difference is that portions of three Wilderness Study Areas (WSAs) were recommended for wilderness designation to address the wilderness issue. The additional wilderness acreage reduced the opportunity for wildlife habitat improvement projects which caused a slight reduction in hunting and fishing recreation visitor days. This caused an insignificant opportunity cost of $1.2 million.

Alternative D

This alternative was designed to emphasize watershed and riparian protection and improvement, to emphasize nongame wildlife opportunities, maximize wilderness opportunities, and maximize special area recommendations, while sustaining some opportunities for timber and fuelwood harvest and livestock grazing. To provide a higher proportion of the total recreation in dispersed recreation opportunities, the alternative was constrained to allow only a 50% increase in developed recreation site areas above present levels. The 50% increase was chosen because it will still satisfy most of the developed recreation demand. These were limited to areas outside of riparian and special areas. All or part of each WSA is recommended for wilderness designation. As a result of these constraints, developed recreation opportunities were greatly reduced from Alternative C along with the contribution to net benefits. Wildlife habitat improvement opportunities were reduced and yielded fewer hunting and fishing RVDs. Riparian and special areas are managed at maximum intensity with increased costs but with no significant increase in priced benefits. The resulting opportunity cost is $44.5 million.

Alternative E

This alternative was designed to give more emphasis to grazing and fuelwood issues and a moderate response to the wilderness issue. Developed recreation was held the same as in Alternative D. Grazing and fuelwood outputs were maintained at moderate levels. Two of the WSAs are recommended for wilderness. Road maintenance was intensified to improve the access for fuelwood and timber harvest and for other recreation opportunities. The increased expenditure for road maintenance did not result in off-setting increases in priced benefits. The increased fuelwood and timber harvest opportunities and their corresponding negative impact on net benefits along with the increased cost for road maintenance is responsible for most of the opportunity cost of $2.4 million.

Alternative B

This alternative was designed to meet the RPA targets assigned to the Forest in the Regional Guide. To achieve the RPA target, the alternative maximizes range management activities and soil and water improvement activities to mitigate the increased grazing impacts. It also increases timber and fuelwood outputs because of increased clearing of woody plants. Wildlife benefits are reduced because of conflicts with grazing. Maximum grazing intensity, timber, and fuelwood all contribute negative net benefits. The alternative also maximizes developed recreation opportunities which have a significant positive contribution to net benefits. However, the negative net benefits, increased costs in soil and water improvements and reduced benefits in wildlife recreation more than offset the developed recreation increases resulting in an opportunity cost of $57.1 million.

Proposed Action

In the Proposed Action the budget was limited to the expected budget levels. The benefit of the budget constraint is to make the alternative implementable considering funding expectations for the first period. The budget limitation greatly reduced new developed recreation opportunities and also resulted in less than standard recreation management. This causes a significant reduction in recreation benefits. Timber and fuelwood opportunities were held at moderate levels to partially address the timber and fuelwood issue and to maintain or improve stand vigor and diversity. This resulted in negative net benefits since maintenance of vegetative health and diversity is mostly a non-priced benefit. Because of the budget constraint, the proportion of the total cost associated with fixed programs such as fire protection, law enforcement, general administration, soil and water protection, etc. which do not yield priced benefits was significantly increased. The opportunity cost is $166.1 million.

Alternative A

This alternative was designed to project the effects of continuing current management. The budget was constrained to current levels and was more constraining than the Proposed Action. Only current prescriptions were used. The opportunity cost of $158.2 million is caused by the total exclusion of increased developed recreation opportunities (new sites) and the reduced budget which results in an even higher proportion of the total cost going to fixed programs that do not yield priced benefits. The use of only one set of prescriptions limits the opportunity to select the most cost-efficient prescriptions.

SIGNIFICANT ENVIRONMENTAL EFFECTS

A summary of significant environmental effects identified in Chapter 4 for all alternatives is displayed below:

Recreation and Wilderness

Under all alternatives recreation uses would be temporarily disrupted by such activities as timber harvest, mining, and road construction. The kinds of recreation opportunities available would vary by alternative. Under alternative A no new wilderness or new developed site opportunities would be provided. Alternative D recommends the largest amount of area for wilderness designation, but Alternatives C and E also recommend additional areas for designations. Under the Proposed Action, there would be one new area recommended for wilderness designation and some new developed recreation sites. The greatest amount of new recreation development and therefore the greatest amount of developed recreation opportunities would be provided under Alternative C and B. Significant reductions in the amount of area open to off-road use by vehicles would occur under the Proposed Action and Alternatives C and D.

Cultural Resources

All alternatives provide for cultural resources survey and compliance procedures prior to ground disturbing activities. A limited amount of interpretation is provided under all alternatives except A. The potential for inadvertent damage to sites exists under all alternatives but is higher under Alternatives PA, A, B, and E because of a larger number of ground disturbing activities.

Wildlife and Fish Habitat

Under the Proposed Action, habitat manipulation from fuelwood and grazing and moderate levels of habitat improvement will be beneficial to most wildlife species. Proper livestock stocking and improved range management will significantly reduce livestock-wildlife conflicts. Riparian habitat will be improved.

Wildlife habitat and populations would be most improved under Alternatives C and E, particularly game species.

Alternative B would only meet legal minimum requirements for wildlife management, and therefore a decline in habitat conditions from current could be expected. Under Alternative D, wildlife habitat for non-game species would be emphasized, however declines in habitat and populations of game species are not expected. Alternative A would result in moderate improvements in both game and non-game habitat.

All alternatives maintain habitat for Federally listed Threatened and Endangered species. Habitats for Federal and State listed species will be most enhanced under Alternatives C and D and there will be a low level under Alternative B.

Range	The Proposed Action is slightly less than current (Alternative A) in livestock permitted use and capacity. By the Fifth Period the Proposed Action is lowest in use and capacity of all alternatives considered. The differences in capacity by the Fifth Period are within 5% among all alternatives except Alternative B. All alternatives produce a balance between capacity and use by the end of the Second Period and overall satisfactory range conditions by the end of the Third Period. Recreation use and fuelwood harvest may produce short term disruption of proper livestock distribution and forage production under all alternatives.
Timber and Forest Products	Due to the differences in the management emphasis of the alternatives, the suitable sawtimber land base (See Chapter 4) varies greatly among alternatives in the acres available for sustained sawtimber harvest. The Proposed Action provides a higher average annual harvest than Alternatives A, D, and E by Period 5. Alternative B provides for the highest average annual harvest but is not sustained after Period 5. Alternative C proposes no sawtimber harvest. Under the Proposed Action and Alternatives A, B, D, and E, timber not sold for commercial sales may be made available for fuelwood harvest. Under Alternative C, no commercial sawtimber harvest would result in an irretrievable loss of timber volume and reduce the ability to maintain the health and vigor of the timber stands. Fuelwood harvest varies by alternative although all alternatives provide for some level of fuelwood harvest. The Proposed Action provides for higher levels of fuelwood volumes and partial demand satisfaction in Period 5 than Alternatives C or D. Alternative B provides for the highest volume of fuelwood available by Period 5, but this is not sustained after Period 5. All alternatives provide less than 1981 harvest levels with Alternatives C and D not approaching more than one-quarter of the 1981 demand. No alternative will likely meet public fuelwood demands by Period 5. Due to varying harvest levels by alternative the control of insects and diseases afforded through treatment varies accordingly. Under Alternative C, no harvest will probably lead to an increase in the spread of certain diseases. Little to no difference is exhibited in the other alternatives.
Plant and Animal Diversity	Temporary changes in vegetation would occur in all alternatives, therefore, there would be variations in plant and animal diversity among alternatives. However, all alternatives provide the necessary diversity to meet the overall objectives of the alternatives.
Soil and Water	The soil resource would be most adversely impacted under Alternative A because a very minor amount of soil and water improvement work would be accomplished. Consequently, under Alternative A, there would be the least amount of acres in satisfactory watershed condition by Period 5. The Proposed Action and all other alternatives would provide for significant increases in soil and water improvement activities. Therefore, they would also include greater amounts of acres in satisfactory condition than Alternative A. Over the long term, soil erosion would be reduced.
Protection	Life and property will continue to be protected under all alternatives. Each wildfire will receive an appropriate suppression response commensurate with values to be protected and burning conditions. Appropriate suppression responses are confinement, containment, or control. (See glossary). Appropriate suppression responses under the Proposed Action will result in reduced costs with probable larger acreage burned with no significant unavoidable adverse impact. Under the Proposed Action and all Alternatives except A, prescribed fires will be utilized in wilderness to meet wilderness management objectives. Additionally lightning fires will be managed as prescribed natural fires in wilderness and appropriate suppression responses will be used when these fires exceed or are anticipated to exceed fire management area prescriptions.

3. Affected Environment

OVERVIEW

This chapter describes the environment that will be affected by implementation of the Plan or alternatives. It is presented in three sections. Section A describes the physical and biological setting; Section B, the socioeconomic setting; and Section C, the current resource situation and management for specific resource elements.

SECTION A
PHYSICAL AND
BIOLOGICAL SETTING

The Coronado National Forest is one of twelve Forests in the Southwestern Region and one of 154 in the United States. It began as Forest Reserves in 1902 and 1907, and became the Coronado in 1908. Twelve blocks of land scattered across southeastern Arizona and a bit of southwestern New Mexico include 1,726,514 acres at the confluence of the Rocky Mountains and Sierra Madres, and the Sonoran and Chihuahuan deserts. Some sections lie on the international border between the United States and Mexico.

Physiography

The Coronado contains Sonoran Desert and Mexican Highlands landscape character types. The Sonoran Desert character type is an area of short mountain ranges in a desert plain. Structurally the area is a series of blocks without a dominant direction of tilting. Metamorphic rocks dominate. This type is represented by the Tumacacori Mountains and the western edges of the Patagonia, Santa Rita, Rincon and Santa Catalina Mountains. The taller Mexican Highlands character type makes up the rest of the forest. It is an area of high desert valleys at elevations of 4,000 to 5,000 feet, with the mountains 3,500 to 7,000 feet higher. The mountain ranges consist of fault blocks with variable direction of tilting.

Climate

The climate varies depending upon elevation. In the Sonoran Desert type, maximum summer temperatures are around 120°; freezing temperatures are rare. Annual precipitation ranges from 11 to 13 inches per year. The Mexican Highlands type is semiarid to arid with temperatures cooler than the Sonoran Desert section. Annual precipitation ranges between 11 and 29 inches. Snowfalls vary at the higher elevations from none to 10 feet.

Geology and Soils

The Forest is located within the Basin and Range geomorphic province. The Forest geologic materials represent all geologic eras. Major rock types are granites, sandstone, limestone, basalt, andesite, schist, quartzite, gneiss, and rhyollite. The soils vary in depth, horizon characteristics and extent of soil loss. This variation results in differences in productivity and erodibility.

The complex geology with varied landforms has resulted in a highly variable and complex soil pattern. The higher mountainous sites have a mix of shallow rocky soils on steep slopes and deeper soils developed under conifer forests in the more gently sloped areas. These soils are formed under the coolest and most moist conditions. Soils forming in areas of 5,000 to 7,000 feet are generally shallow residual rhyolite or granite soils with deeper sandy to loamy soils on the lower slopes. In the lower areas, soils are generally deep, and well developed. The major limiting factor for vegetative production on these sites is soil moisture deficiency.

About half of the Forest lands are theoretically favorable for prospecting or exploration for locatable minerals. About seven percent is demonstratively favorable for production of those minerals. There is considerable speculation that the Forest may have potential for development of energy related minerals, especially oil and gas.

Vegetation

Due to the wide variation in soils and climate, vegetation is highly diverse. Plant communities range from Sonoran desert scrub lands on the dryer, lower altitudes through grassland, oak woodlands, ponderosa pine and Engelmann spruce on the high mountain peaks (Table 13). Lower elevation, dryer ecosystems are predominate.

Table 13. Acres by Vegetative Groups

Vegetation Grouping	Acres
Southwestern Desert Scrub	227,193
Desert Grassland	186,188
Plains Grassland	28,102

Table 13. Acres by Vegetative Groups (Continued)

Vegetation Grouping	Acres
Mountain Grassland	930
Interior Chaparral	78,299
Broadleaf Woodland	847,078
Oak Savannah	30,201
Coniferous Woodland	155,667
Deciduous Forest	309
Coniferous Forest	115,088
Higher Ecosystem Extensions:	
Mesquite	4,669
Oak	15,983
Riparian Types:	
Deciduous	25,976
Coniferous	10,831
TOTAL	1,726,514

Riparian

Riparian areas are an important land type cutting through all vegetative formations. These areas are ecosystems which have a high water table because they are near a stream (perennial or intermittent), lake, pond or subsurface water. These ecosystems usually occur as a transition between aquatic and upland ecosystems, but have distinct vegetation and soil characteristics. They also have a very high biological productivity.

Riparian areas are very important for livestock grazing, fuelwood cutting, wildlife habitat, fishing, and recreation. Roads are frequently found in these flatter areas. These limited areas cover about 3% of the total land area of the Coronado National Forest.

Wildlife and Fish

576 vertebrate species are found within the Forest. This is a direct result of the unusual variety in vegetation, climate and geology. Many species are endemic to the highlands of Mexico and found nowhere else in the United States. This great number of unusual animals attract many visitors to the area. Sixty-four wildlife species are listed as either threatened or endangered by Arizona, New Mexico, or the federal government.

SECTION B
SOCIAL AND
ECONOMIC SETTING

Humans have lived in southeastern Arizona and southwestern New Mexico for over 12,000 years. Their pattern of life and the history that followed influences today's lifestyle and attitudes. The prehistoric cultural record of this area is poorly understood. The area lies at the periphery of two cultures, the Hohokam and Mogollon, creating complexity and an area of transition without definite roots to one culture or another. At the time of Spanish contact, southeastern Arizona was inhabited by a number of Pima speaking groups. The Sobaipuri farmed the San Pedro River Valley and served as a buffer between the Apache and the Spaniards until 1762 when they were forced to abandon the area under pressure from Apache raids. Other Pima speaking groups had villages along the Santa Cruz River. They gave rise to the modern Papago people.

The first Spanish explorers came to the area in 1539-40. From the 1600's to 1821 what is now southern Arizona was part of the northern frontier of new Spain; from 1821 to 1848 was part of the Mexican state of Sonora. In 1853 as a result of the Gadsden Purchase, it became the Territory of New Mexico in the United States. The Arizona Territory was created in 1863. This is the area known in western lore for the town of Tombstone, Indian leader Cochise and the Butterfield stage. On February 14, 1912, Arizona achieved statehood.

Area of Influence

The Forest area of social and economic influence is located in two states and seven counties, as well as border communities in Sonora, Mexico. These counties and states are: Cochise, Graham, Greenlee, Pima, Pinal, and Santa Cruz counties in Arizona, and Hidalgo County in New Mexico. Sonoran towns within the zone include Nogales, Santa Cruz, Naco, and Agua Prieta.

Population

The Tucson Metropolitan area is the dominant population center within the Forest zone of influence. However, 57% of the population in the United States part of

the zone of influence lives outside of Tucson. Other areas in the zone of influence with populations of over 10,000 include:

1. Douglas, Arizona and Agua Prieta, Sonora.
2. Nogales, Arizona and Nogales, Sonora.
3. Sierra Vista and Fort Huachuca, Arizona.
4. Safford and Thatcher, Arizona.

The remaining communities within the zone of influence generally exhibit a rural atmosphere tied to ranching, farming, mining, or retirement.

Population growth has been rapid in the past, as shown in Table 14, and will continue at a high rate into the future within the Forest zone of influence. On a percentage basis (1950-1980) historical growth has been greatest in Pima and Cochise Counties, while projected growth is greatest in Santa Cruz and Pima Counties, with lower but still high growth rates in Pinal, Cochise, and Graham counties. Greenlee County had a decrease in population from 1950 to 1980, and the population is projected to remain at about current levels.

Table 15 shows two cultural groups dominate the area, the Hispanic- Americans and Anglo-Americans. Free movement across the border between Mexico and the United States insures a flow of cultural exchange, economic goods and family ties. Mexicans use the Coronado National Forest for recreation and to harvest products.

There are other ethnic groups in the area including Blacks, Orientals and Native Americans. The San Carlos Apache Reservation borders part of the Safford Ranger District, with the Fort Apache Reservation immediately to the north. The Yaqui Tribe has a reservation in the Tucson metropolitan area, and the Papago Reservation is a few miles west of the Coronado.

Table 14. Population by County (Source: Arizona Statistical Review and Arizona Department of Economic Security)

County	1950	1960	1970	1980
Cochise	31,488	55,039	61,918	87,400
Graham	12,985	14,045	16,578	23,000
Greenlee	12,805	11,509	10,330	11,500
Pinal	43,191	62,613	68,579	91,200
Santa Cruz	9,344	10,808	13,966	20,500
Hidalgo, N.M.	5,095	4,961	4,734	6,049
Pima	141,216	265,660	351,667	536,100
	256,124	424,695	527,772	775,749
Average Annual % Increase	6.6	2.4	4.7	

Table 15. Populations by Ethnic Status in Arizona Counties Surrounding the Coronado National Forest (1977) (Source: Estimate by Arizona Department of Economic Security)

County	Total	Anglo	Hispanic	Indian	Black	Other
Number in thousands:						
Cochise	86.7	51.2	22.9	.5	3.3	8.8
Graham	22.9	11.6	5.5	2.7	.5	2.6
Greenlee	11.4	3.9	5.5	.2	0	1.8
Pima	531.3	331.4	111.5	14.9	15.1	58.4
Pinal	90.9	35.1	26.8	8.5	3.0	17.5
Santa Cruz	20.5	1.3	15.2	.1	.1	3.8
Total	763.7	434.5	187.4	26.9	22.0	92.9

Table 15. Populations by Ethnic Status in Arizona Counties Surrounding the Coronado National Forest (1977) (Source: Estimate by Arizona Department of Economic Security) (Continued)

County	Total	Anglo	Hispanic	Indian	Black	Other
Percentage Distribution						
Cochise	100.0	59.1	26.4	.6	3.8	10.1
Graham	100.0	50.7	24.0	11.8	2.2	11.3
Greenlee	100.0	34.2	48.2	1.8	0	15.8
Pima	100.0	62.4	21.0	2.8	2.8	11.0
Pinal	100.0	38.6	29.5	9.4	3.3	19.2
Santa Cruz	100.0	6.4	74.1	.5	.5	18.5

Employment and Income

Table 16 displays the employment (1977) for Pima County and the four county area (Santa Cruz, Cochise, Graham and Greenlee Counties) and highlights sectors most sensitive to National Forest management. The employment figures reflect numbers of jobs which may be full or part-time jobs. The income figures reflect the total income generated within the economy, including direct, indirect and induced effects.

The National Forest is not a significant (greater than 10%) factor in the economy of the area or any of the selected sectors as shown in Table 17.

Table 16. Total Income and Jobs in Area of Influence (1977)

County	Total Income (Millions $)	Total Jobs	Jobs From Selected Sector			
			Livestock	Tourism	Retail Trade	Other
Pima County	2343.3	123623	172	13168	23075	87208
4 County Area	402.2	23095	329	2326	5004	15436

Table 17. Income and Employment Attributable to Forest Service (1977)

County	Total Income (Millions $)	Total Jobs	Jobs From Selected Sector			
			Livestock	Tourism	Retail Trade	Other
Pima County	24.0	1554	16	434	395	709
4 County Area	45.3	3266	82	901	1010	1273

The average per capita income for the six Arizona counties in 1978 was $5,166. By 1981 it has risen to $8,251. Adjusting for inflation this would mean a net decrease in real income of at least 8.9% at National inflation rates and of 16.3% based on Phoenix inflation rates. For Hidalgo County, New Mexico, the per capita income in 1978 was $6,168. By 1981 it has risen to $8,190. This would be at least a 10% decrease in real income adjusted for National inflation rates.

The labor force within the seven counties affected by the Coronado was 334,658 for 1983. Employment for 1983 was 295,218. The six Arizona counties had unemployment rates in June 1983 as follows: Cochise 11.1%, Graham 24.3%, Greenlee 6.5%, Pima 9.4%, Pinal 19.9%, and Santa Cruz 25.4%. In July 1984, the figures were as follows: Cochise 6.5%, Graham 7.6%, Greenlee 5.7%, Pima 3.8%, Pinal 9.6%, and Santa Cruz 14.2%. Hidalgo County, New Mexico had an unemployment rate of 6.9% in 1983 and of 5% in July, 1984.

A number of factors are contributing to an economic decline in many of the areas within the Forest zone of influence. This includes the depressed copper market which has caused reduced work forces or shutdowns and layoffs at mines and smelters at various places throughout the zone of influence. Another serious factor has been the devaluation of the peso which has greatly reduced trade and commerce in Douglas, Nogales, and other border communities. This is brought about because people from Mexico get fewer dollars for their peso now, and so can buy relatively little in the United States compared to just a few years ago. At the same time, this confines much of this trade to the Mexican side of the border, and this has a tendency to strengthen the business climate in Agua Prieta and Nogales, Sonora.

Irrigated agriculture has declined greatly in parts of the zone of influence. To a great degree this is due to the increased pumping costs for irrigation water due to higher energy costs. It also reflects a general tight economic situation in American agriculture. This has had a depressing effect on the economy in many of the rural communities. In 1981, average per capita income in Pima and Greenlee counties was 33% higher than the average per capita income of the other four counties.

Because of this economic situation, many people feel entrapped by factors beyond their control. These factors are perceived as including the power structures of government, business, the market, unions and the economy, among others.

In view of this, anything that decreases their recreational enjoyment or economic benefit from the Forest, adds to their frustrations and discontent. Conversely, anything that promotes their enjoyment or benefit from the forest is seen in a positive light and helps to a greater or lesser degree to alleviate their situation.

Lifestyle, Social Economic Situation

The communities within the Forest zone of influence are generally characterized by a rural lifestyle. The exception is the metropolitan area of Tucson. The communities of Douglas, Nogales, Sierra Vista, and Green Valley fall somewhat in between, but many people feel close ties to the rural communities and lifestyle.

The smaller communities exhibit varying degrees of dependence upon land utilization. This utilization includes such endeavors as farming, ranching, mining, prospecting, firewood gathering and trapping. Because of this tie to the land, residents tend to support development and use of commodities while giving less emphasis to amenity values. However, they also engage in amenity activities such as hunting, fishing, camping, hiking, off-road vehicle use and other outdoor recreation activities on the Forest. Forest recreation pursuits are particularly important to people living in rural communities near the forest. Movies, bowling, theater, professional sports, museums, social organizations, and other recreation opportunities that exist in larger towns are not readily available in rural areas and require long trips to town. The time and/or money for these trips may not be easily come by. The National Forest may be their only feasible alternative for wholesome recreation. For many of these people firewood gathering is an economic necessity, not a recreational pursuit.

The rural community inhabitants enjoy their lifestyle and the freedom it provides. They appreciate the openness of the Forest and tend to resent any management direction which limits their accustomed use of these lands.

The smaller communities also exhibit the desire to retain their rural atmosphere. This does not, however, mean that change is not possible with time. Many of the smaller communities are unable to provide total services to their residents such as grocery stores, schools, and vehicle repair and look for opportunities to expand their economies.

In Tucson, and to some degree in the other larger towns, the lifestyle is urban. Residents utilize the Forest as a means of briefly altering their lifestyle. These lands provide the metropolitan dwellers an opportunity to get away from their every day lifestyle even if for only a short period. They enjoy the open atmosphere of these lands and do not seem to be as sensitive to the restrictions placed on them. They utilize these lands more for their amenity value than for commodities. Activities include sight-seeing, picnicking, camping, hiking, nature study, hunting, fishing, skiing, and firewood gathering.

Increasing pressures of urban life necessitate an escape valve where people can get away from the stress of rush hour traffic, air pollution, regimented business and commercial life, and the other tight restrictions and regulations that come with crowded urban living.

The Forest substantially enhances the quality of life for urban residents by both providing a visual backdrop of mountains as well as recreation opportunities in a mountainous setting. The frequency of visits by some people from the urban areas results in an intense interest in Forest management decisions and resource uses.

The urban dwellers' philosophy of management is somewhat different than that of the small community resident. They generally support amenity values. Some do not enjoy seeing activities which alter the wildland atmosphere.

Winter visitors, fleeing from the snowy Northeast and Midwest, come to the warm areas of the Coronado to relax and enjoy the natural setting. Rare birds, such as the Coppery-tailed trogon, bring a select group of visitors. The impacts of Forest management on these people are substantially less direct.

In summary, the National Forest is an important part of the western outdoor lifestyle enjoyed in southern Arizona and New Mexico. It plays a role in the economic well-being of specific individuals and their families, but it does not play a major economic role in the region's economy.

SECTION C RESOURCE ELEMENTS

The Forest may be described in terms of natural resources and the support activities needed to protect these resources and to supply goods and services. The following discussion portrays the management situation.

Although resources are discussed individually, management of the Forest occurs on an integrated resource basis. Each management activity affects a variety of resources and decisions are made only after considering the entire set of ramifications involved. Similarly, single management activities are designed to serve a variety of resource objectives. The resources discussed below are part of a complex system with numerous interactions. Resources are described individually only to emphasize important aspects of the current situation. Discussion of these resources must be conceptually combined in order to understand the overall current situation of the Forest.

RECREATION

The Coronado National Forest encompasses most of the high quality mountain-outdoor recreation land in Southeast Arizona, and the New Mexico panhandle. A variety of recreation opportunities such as camping, hiking, picnicking, hunting, and many more are found on the the Forest. Current use by activity group is shown in Table 18. Nonmotorized recreation such as hiking, hunting, camping, and swimming accounts for 70% of all recreation. Current policy is to provide a mix of developed and dispersed recreational opportunities in conjunction with those provided by other agencies and landowners. The total reported recreation use has increased by 74% since 1971 (1.4 million RVD's to 2.5 million RVD's).

Table 18. Total Recreation Use by Activities

Activity Group	Annual MRVD 1980	Percent of Total
Water Based	53	2%
Nonmotorized	1762	70%
Motorized	377	15%
Wildlife	235	10%
Fishing	82	3%
Total	2509	100%

Developed Recreation

Land suitable for developed recreation sites is plentiful in certain areas and scarce in others. Unfortunately, the better sites are not always accessible due to a lack of roads and/or rights-of-way. The Catalina Mountains are highly developed for public recreation. Substantial areas suitable for public recreation use are occupied with private, semipublic, and commercial uses. There may be other private sector opportunities to provide services on and adjacent to the National Forest. These opportunities must be pursued if increased demand for developed recreation is to be met.

Total area currently committed to developed sites of all types is 3,990 acres. Additional suitable acres total about 2,750 acres. For the most part, use limitations have not been used as a management strategy, however some developed sites are closed on a day-to-day basis as their capacity is met.

Nearly all sites are currently operated and maintained at a reduced service level because of budget limitations. This results in a shortened season of use and limited clean-up and maintenance. Many sites are in need of major rehabilitation. Additionally, there is little knowledge of areas that may become overused in the future nor have levels of carrying capacity (numbers of people who can use an area without damage to natural resources) been established for these areas. Without such use knowledge and subsequent user controls, areas could become damaged. Visitor control and general resource protection continue to decline.

There are only a few existing sites with facilities that will accommodate a physically handicapped person. Existing sites are being studied for modifications for this user group and any new sites, designs, or rehabilitation projects will also consider handicapped user needs.

One recreation area is currently under permit to a concessionaire.

Table 19. Developed Recreation Use by Type of Site (1980)

Site Type	Number of Sites	Total Practical Capacity (MRVD)	Existing Use (MRVD)	% of Capacity Used	% of Total Use
Campground	30	566.232	524.540	93%	44%
Picnic Areas	24	258.466	328.620	127%	28%
Resorts & Lodges	2	54.477	21.900	40%	2%
Organization Sites	10	206.005	141.480	69%	12%
Recreation Residences	412	363.215	92.600	26%	8%
Winter Sports Areas	1	29.200	21.900	75%	2%
Other	20	55.144	49.960	91%	4%
TOTAL	499	1,532.739	1,181.000		100%

Future Trends

Projected Trend for Average Annual Developed Recreation Use by Period (MRVDs)

1	2	3	4	5
1440	1755	2139	2608	3179

If developed recreation use increases as anticipated and current budget constraints continue, the following consequences could be anticipated: 1) some of the current sites would be removed or closed because of health or safety problems; 2) conflicts between different users or user groups will be a major problem; and 3) the quality of recreation opportunities the Forest can provide will be much less than potential.

Future use demands could be partially met by increasing clean-up and maintenance efforts, encouraging private sector involvement, increasing access, increasing volunteer efforts, increasing communications between users, increasing public awareness of developed recreation opportunities and construction of additional recreation sites.

Dispersed Recreation

Specific Dispersed Recreation opportunities available to the forest visitor include hiking, backpacking, picnicking, camping, hunting, fishing, gathering forest products, driving for pleasure, bird watching, swimming, gold panning for pleasure, rock climbing, hang gliding, general leisure and sightseeing.

Current total annual dispersed use outside wilderness areas is 1,148,000 recreation visitor days. Excluding hunting and fishing use, the dispersed total is 831,000 recreation visitor days. The practical potential is estimated at 3,000,000 recreation visitor days.

There are approximately 1.73 million acres available for dispersed recreation activities. These acres are categorized by use of the Recreation Opportunity Spectrum classes. Many of these acres are not currently accessible to the puclic due to the lack of roads and/or rights-of-way.

The ROS classes provide a framework for defining the types of outdoor recreation opportunities the public desires and identifying what portions of the spectrum the forest might be able to provide. Table 20 shows the current acres by recreation opportunity spectrum.

Table 20. Opportunities by Recreation Opportunity Spectrum

ROS Class	Acres	Percent
Primitive	138,990	8
Semi-Primitive Nonmotorized	384,592	22
Semi-Primitive Motorized	1,002,672	58
Roaded Natural Appearing	195,651	11
Rural	3,653	1
Urban	956	
	1,726,514	100

Off Road Vehicles

The Coronado has a Vehicle Management Plan which defines areas that are: (1) open to cross-country motorized travel, (2) closed to all motor vehicle travel including roads, and (3) areas where motorized travel is limited to designated roads and trails. The plan is administered by signing and distribution of maps. The current situation is reflected in Table 21. The demand for motorized vehicle use is increasing. This demand will mean increased need to provide this recreation opportunity. However, increased use and potential for travel off roads will require greater care to protect resources such as soil, water, and vegetation, and other conflicting uses such as hiking, fishing, and hunting.

Table 21. Off Road Vehicle Restrictions (Current)

Designation	Acres	Percent
Open	960,000	56
Closed	434,000	25
Restricted	333,000	19

Recreation Special Uses

There are over 400 recreation residence special use permits on the Forest, 15% of which are under termination notice. Earlier Environmental Impact Statements determined that all recreation residences in Madera Canyon and certain ones in the Santa Catalina Mountains should be terminated because the land is needed for higher public use. Table 22, summarizes recreation special uses.

Table 22. Special Use Permits for Recreation Use

Site Type & Name	Number of Permits
Recreation Residences:	
Santa Catalina District	
Upper Sabino (6)*	6
Soldiers Camp (2)*	53
Willow Canyon North Rim	56
Willow Canyon South Rim	18
Bear Wallow	6
Carter Canyon	3
Loma Linda	65
Middle Sabino (6)*	35
Douglas District	
South Fork Cave Creek	2
Cave Creek	8
West Turkey Creek	14
Rustler Park	6

Table 22. Special Use Permits for Recreation Use (Continued)

Site Type & Name	Number of Permits
Safford District	
Columbine	14
Turkey Flat	74
Nogales District	
Madera Canyon (52)*	52
Winter Sports Area	1
Resorts	2
Organization Sites	10
Clubs	2
Other (target range, outfitter, store recreation event, boat dock)	20
	447 (on 445 Acres)

*( ) number of permits being phased out.

Trails

Hiking is a popular activity on the Coronado's 979.2 miles of trails. Some trails are in disrepair, and full and proper maintenance of the system for users would only be possible after an extensive reconstruction program.

Caves

The Forest contains numerous major and minor caves and new caves are still being discovered. Visits to the caves have been increasing and vandalism is an ever increasing problem. Current management ranges from no management to physically securing the most popular caves and issuing use permits to qualified individuals or groups. There is a need for basic data on location of caves and a description of their physical and biological condition.

Future Trends

Projected Trend for Average Annual Dispersed Recreation Use by Period (MRVDs)

1	2	3	4	5
1013	1235	1505	1835	2237

The demand for dispersed recreation use will increase substantially on the Forest as population increases, more leisure-time lifestyles develop and travel costs rise.

The desire to escape the desert heat will continue to be a prime motivator for dispersed use but it will be augmented to a great degree by the desire, or very real need, to escape from the high-tech high-stress environment of the metro desert areas.

Future use of ORVs on the forest will continue to increase, at least in the near future, and additional closures or restrictions may be needed for protection of the resources and/or public safety. Snowmobile use is not a problem at this time but should be monitored, especially in areas where winter access is improved.

The Forest has the potential to accommodate future use, with an estimated capacity of 3196 MRVDs. Accommodating this use will require improvements such as trails, roads, and rights-of-way necessary to access the forest and disperse the visitors once they are on the forest.

Managing the use will involve shifting some of the impact from traditionally popular areas to some of the lesser used areas of the forest. It will often involve cooperating with other agencies to make programs complimentary and minimize duplication of efforts. Increased utilization of volunteer and manpower programs and an aggressive public information program will also be critical to an efficient and well-managed program.

WILDERNESS

The New Mexico Wilderness Act of 1980 (PL 96-550) designated two Wilderness Study Areas (Whitmire Canyon and Bunk Robinson) on the Coronado National Forest and released the remaining study areas to other multiple uses.

The Arizona Wilderness Act of 1984 (PL 98-406) added five wilderness areas to the existing system and increased the size of two existing areas on the Coronado. Table 23 displays the acreage for each area. It also established three wilderness study areas (The Arizona portions of Whitmire Canyon and Bunk Robinson and Mt. Graham) and released all other study areas for other multiple uses. The acreage of each study area is:

	Total	AZ	NM
Bunk Robinson WSA	15,960	850	15,110
Whitmire WSA	12,840	5,080	7,760
Mount Graham WSA	62,000	62,000	--
	90,800	67,930	22,870

Both laws prohibited further consideration of remaining roadless areas (except those designated as wilderness study areas) as potential wilderness until the initial Forest Plan is revised. Additional wilderness, therefore, is considered in the alternatives only for the Congressionally designated Wilderness Study Areas.

The Bureau of Land Management (BLM) has been studying roadless areas under its jurisdiction for possible inclusion in the wilderness system. The Coronado and BLM have agreed to jointly consider contiguous study areas of both agencies. The BLM Wilderness Study Areas included in this planning process are:

BLM Galiuro WSA - 640 acres (contiguous to Galiuro Wilderness)

Bowie Mountain WSA - 6156 acres (contiguous to previous North End Roadless Area)

Although the North End Area will not be studied for wilderness designation, the Bowie Mountain WSA will continue as part of this joint study since it exceeds 5000 acres in size.

Baker Canyon WSA - 4812 acres (contiguous to Bunk Robinson WSA)

Guadalupe Canyon WSA - 4145 acres (contiguous to Bunk Robinson WSA)

Wilderness Study Areas

The following is a summary of the physical and biological descriptions for each WSA. More detailed descriptions can be found in the Technical Reports available at the Coronado N.F. Office, Tucson, AZ; the Safford BLM District Office, Safford, AZ and the Las Cruces BLM District Office, Las Cruces, N.M.

Bunk Robinson

The Bunk Robinson WSA is located in the Peloncillo Mountains approximately 100 miles southeast of Tucson, Arizona. Immediately to the north of it is the Whitmire Canyon WSA. Immediately adjacent to the southwest corner of the Bunk Robinson WSA is the 4812 acre BLM administered Baker Canyon WSA. The south end of Bunk Robinson WSA connects with the 4145 acre Guadalupe Canyon WSA which is also administered by the BLM. Bunk Robinson WSA is characterized in its southern portion by shallow canyons with rolling hills and low mountains. The northern portion is generally high peaks with gently sloping ridgetops and shallow canyons. This WSA includes Guadalupe Canyon. 850 acres of this WSA occur in Arizona and 15,110 are in New Mexico (total area is 15,960 acres). Elevations range from 4800 to 6450 feet. This area has four distinct vegetation communities: (1) riparian which is characterized by Fremont cottonwood, Arizona sycamore and seep willow; (2) desert shrub which is characterized by thickets of mesquite, catclaw, white-thorn and grey-thorn; (3) juniper which consists of uniformly scattered one-seed juniper and shrub live oak with understory of Wright's silk tassel, skunk bush, evergreen sumac, desert spicebush, and sotol, and (4) the pinon-juniper community which is dominated by Mexican pinon and one-seed juniper with subdominants of catclaw and white-thorn and understory of grama grasses. As defined by Bailey and Kuchler, this area is within the Mexican Highland Shrub Steppe Ecoregion with one predominant potential natural vegetation community identified as the Oak-Juniper Woodland. The 15,960 acres of this WSA are generally natural in appearance due to the relative isolation of the area. The primary use of this area currently is

livestock grazing, mineral prospecting, nature study, hiking, and hunting. Portions of six grazing allotments occur within this WSA. There are only six known mining claims within the area. With the exception of active mining claims near the northwest corner or the WSA, the potential for minerals and oil or gas is rated as low. Human imprints include a few well screened dirt water tanks, spring developments, and fences. Occasionally smoke from the smelters at Playas, New Mexico and Douglas, Arizona blows into the area. Military jet aircraft occasionally fly at low levels over the area. The WSAs remote location, size, topography, and vegetation offer numerous opportunities for solitude. A significant number of species such as Mexican turkey and mountain lion and threatened and endangered plant and animal species occur within or in close proximity to this WSA. The major attractions to this area for visitors are the rugged, rocky canyon walls, and the variety of flora and fauna (including riparian species) in Guadalupe Canyon.

Baker Canyon

The 4182 acre Baker Canyon WSA is similar to the adjoining Bunk Robinson WSA in both physical and biological aspects. In Baker Canyon there are no known mining claims. There is one oil and gas lease covering 1405 acres. Portions of three livestock grazing allotments cover the WSA. Part of the Baker Canyon WSA falls within the Grama-Tobosa Shrub Steppe potential natural vegetation community as defined by Bailey and Kuchler. The rest of the area is in the Oak-Juniper Woodland as is the Bunk Robinson WSA.

Guadalupe Canyon

The Guadalupe Canyon WSA is 4145 acres in size and is similar to the Bunk Robinson WSA in physical and biological aspects. A total of 3691.7 acres of this unit was designated as an Outstanding Natural Area in 1971. Section 603 of the Federal Land Policy and Management Act (PL-94-579) directed the Secretary of the Interior to study for wilderness designation all those areas which had been formally designated as natural or primitive areas prior to November 1, 1975. These areas, including Guadalupe Canyon became known as Instant Study Areas (ISAs).

In the preliminary wilderness assessment conducted by the Las Cruces District in 1979, it was found that the areas were composed of two distinct parcels separated by a mile of private land. There is an eastern parcel composed of 1935.15 acres and a western parcel containing 1756.55 acres. The western parcel is divided by a maintained road, and the eastern parcel is relatively natural, containing only one small stock watering pond. It was concluded that the ISA, when studied by itself, would not be suitable for wilderness designation. However, the ISA, or portions of it, may be suitable when studied with contiguous Federal lands concurrently under wilderness review.

The eastern parcel is contiguous to the Bunk Robinson WSA. The western portion is contiguous to a 454 acre section of split estate (Federal surface/Non-Federal subsurface ownership) land that is in turn contiguous to the Baker Canyon WSA and again to the Bunk Robinson WSA.

On December 30, 1982, Interior's Secretary Watt's policy announcement stopped further study for wilderness designation of split estate lands. This resulted in the 1756.55 acre western parcel no longer being contiguous. The lawsuit filed by Sierra Club, et al. contesting the former Secretary's decision was resolved in April of 1985. The result of that resolution on this 454 acres of public land is that it is once again being studied for potential wilderness designation. This makes the Guadalupe Canyon WSA 4145.7 acres in size.

Whitmire Canyon

The Whitmire Canyon WSA is located in the Peloncillo Mountains approximately 100 air miles to the southeast of Tucson, Arizona. Immediately to the south of it is the Bunk Robinson WSA. Whitmire Canyon WSA is characterized by rough, steep canyons. It encompasses portions of both sides and the top of the main ridge of the Peloncillo mountains. 5080 acres of this WSA occur in Arizona and the remaining 7760 acres are located in New Mexico (total area is 12840 acres). Elevations range from 5200 to 6500 feet. Perennial grasses, several species of oak and juniper, pinyon pine, mountain mahogany, and manzanita dominate the more northerly aspects. Southerly aspects most generally have perennial grasses, bear grass, yuccas, agaves and infrequent occurrences of mesquite shrubs. Unique species such

as Apache and Chihuhua pine grow in small clusters at the head of several large canyons. Arizona sycamore and walnut, ash and willow grow in the riparian areas of the larger canyons. As defined by Bailey and Kuchler, this area is within the Mexican Highland Shrub Steppe Ecoregion with one potential natural vegetation community identified as the Oak-Juniper Woodland. The 12840 acres of this WSA are generally natural in appearance due to the relative isolation of the area. The primary use of this area is livestock grazing and big game hunting and hiking. Portions of six grazing allotments are found within the WSA. Only seven known mining claims are found within the area and these are located near the southern boundary. Potential for locatable minerals and oil or gas is rated as low. Human imprints include a few well screened stock tanks and fences. Infrequently, smelter smoke from the smelters at Playas, New Mexico and Douglas, Arizona blows into the area. Military jets occasionally fly at low levels over the area. The WSAs shape, topography, vegetation, and few trails offer opportunities for solitude. Wildlife such as turkey and mountain lion are found in this area. Geronimo's use of this area adds to the historical value of the Whitmire Canyon WSA.

Mt. Graham

The Mt. Graham WSA is located in the Pinaleno mountains approximately 125 road miles from Tucson and eight miles south of Safford, Arizona. This WSA is dominated by rugged steep slopes and deep canyons. All 62,000 acres of this WSA are in Arizona. Elevations range from 3600 to 10,000 feet. There are three vegetation life zones present: (1) the Canadian with Douglas fir, white fir, Engelmann spruce, white pine, cork bark fir, aspen, and Schouler willow; (2) the Transition which includes Ponderosa pine, Ponderosa pine var. Arizonica, Chihuahua pine, Gambel and silverleaf oak, aspen boxelder, alder, maple, ash, madrone and walnut; and (3) the Upper Sonoran subdivision of the Sonoran life zone with generally dense stands of Arizona white oak, emory oak, alligator juniper, manzanita, shrub live oak, ceanothus, and grama grasses. Arizona sycamore occurs in the larger drainages and the Lower Sonoran subdivision with mesquite, several species of cacti and grasses. Vegetative diversity of the area is noteworthy. As defined by Bailey and Kuchler, this area is within the Mexican Highland Shrub Steppe Ecoregion with two potential natural vegetation communities identified as the Arizona Pine Forest and Oak-Juniper Woodland. The 62,000 acres of this WSA are generally natural in appearance due to its ruggedness and vegetative diversity. The primary use of this area is currently recreation in the form of big game hunting, nature study, and hiking. Livestock grazing is also present. Potential for mineral development including oil and gas is rated as low. Human imprints are primarily range improvements such as fences, water developments, and corrals. These developments do not greatly impair the natural integrity of the area. Impacts from outside the area can be viewed from various vantage points throughout the WSA and consist of habitation centers, roads, and cultivated fields. Opportunities for solitude are present primarily because of the large size of the area and topographic and vegetative screening. A number of species of threatened and endangered plants and animals occur in this WSA; including the twin-spotted rattlesnake. The primary attractions are the major canyons of Ash, Frye, Deadman, Gibson, Marijilda, and Grant. All of these have perennial streams which are quite rare in the Southwest. In addition there are spectacular rock formations and great diversity of vegetation patterns and animal life including deer, bear, javelina, and mountain lion.

Bowie Mountain

The Bowie Mountain WSA is located on the northern end of the Chiricahua Mountains approximately 30 miles southeast of Wilcox and 110 miles southeast of Tucson, Arizona. This 6156 acre WSA is adjacent to the former North End Roadless Area identified during the RARE II process. There are two parcels of private land within the WSA totaling 351 acres. Bowie Mountain itself rises from a base elevation of about 5080 feet to a height of 6943 feet. The terrain around Bowie Mountain is rugged with fairly steep drainages. The remainder of the WSA consists of lower rounded mountains cut by many drainages. The majority of the WSA is a mountain shrub vegetation type. Understory grasses are primarily a mixture of grama grasses. The overstory consists of alligator juniper, Emory oak, hairy mountain mahogany and shrub oak. The drainages are lined with desert hackberry, apache plume, Arizona walnut, Arizona sycamore, and chittamwood. As defined by Bailey and Kuchler, this area is within the Mexican Highland Shrub Steppe Ecoregion with two potential natural vegetation communities identified as Grama Tobosa Shrub Steppe and Oak-Juniper Woodland. The WSA is natural in character with the evidence of man present but substantially unnoticeable. The present

facilities, which are scattered throughout the unit, are the result of past mining activity and current range and wildlife management efforts. Opportunities for solitude exist throughout the WSA. The pinyon-juniper forest, mountainous terrain and many canyons and drainages offer opportunities to find isolation and the feeling of solitude. The WSA provides opportunity for primitive and unconfined types of recreation. This variety of opportunities include hiking, camping, backpacking, hunting, rockhounding, horseback riding, photography, birdwatching, rock climbing, sightseeing and historical and nature study. The area contains portions of one seasonal and three yearlong grazing allotments. Mineral and oil or gas potential is mostly undetermined. Past mineral activity in and adjacent to the WSA would indicate some mineral potential. There is one oil and gas lease covering 3,387 acres in the east half of the WSA. There are nine known mining claims. The wildlife species of the WSA are typical of the Chihuahuan and Sonoran Desert biotic provinces. The rock outcrops of Bowie Mountain and Helen's Dome provide nesting sites for several raptors. The WSA is rich in the history of Fort Bowie, the Butterfield Stage Route and the Chiricahua Apache Indians.

BLM Galiuro

The BLM Galiuro WSA is located on the south end of the Galiuro Mountains approximately 20 miles northwest of Wilcox and 40 miles northeast of Tucson, Arizona. The 640 acre WSA is adjacent to the southeast corner of the newly enlarged (1984) Galiuro Wilderness Area administered by the Coronado National Forest. The BLM Galiuro WSA is characterized by moderately sloping to moderately steep hills and mountains at elevations of 4800 to 6300 feet. The dominant vegetation is oak and juniper. As defined by Bailey and Kuchler, this area is within the Mexican Highland Shrub Steppe Ecoregion with one potential natural vegetation community identified as the Oak-Juniper Woodland. The WSA is highly natural in character with the only imprint of man being one masonry dam. The rugged nature of the topography, vegetation type and several drainages provide opportunities to find and experience solitude. Limited access to this remote area enhances opportunities for solitude. Diverse opportunities for primitive recreation are provided through a variety of activities including hiking, horseback riding, backpacking, hunting, camping and sightseeing. There are no known special features within the WSA. There are no known mining claims or mineral leases in the area. The grazing allotment in this WSA is now under nonuse.

Use and Management

The Forest contains 339,190 acres of designated wilderness in 8 areas, or 19.6 percent of the Forest acreage. The eight wildernesses are utilized for a wide variety of dispersed recreation activities. These activities include viewing scenery, hiking, horseback riding, camping, cross-country skiing and snowshoeing, environmental studies, solitude, technical rock climbing and hunting. Estimated wilderness use as of 1980 is displayed in Table 23.

Both laws also declared that, subject to valid existing rights, the wilderness study areas are to be administered so as to maintain their presently existing wilderness character and potential for inclusion into the Wilderness Preservation System.

Table 23. Existing Wilderness Acres and Use

WILDERNESS	ACRES	1980 USE MRVDs
Chiricahua (original)	18,000	11.1
(1984 additions)	69,700	Not Known
Total	87,700	
Galiuro (original)	52,717	8.3
(1984 additions)	23,600	Not Known
Total	76,317	
Pusch Ridge	56,933	99.0
Miller Peak	20,190	13.7
Mt. Wrightson	25,260	27.3

Table 23. Existing Wilderness Acres and Use (Continued)

WILDERNESS	ACRES	1980 USE MRVDs
Pajarita	7,420	1.3
Rincon Mountain	38,590	13.1
Santa Teresa	26,780	6.4
TOTALS	339,190	180.2

Management of the wildernesses is generally accomplished through the use of seasonal employees and volunteers. Management plans have been completed for the Chiricahua (original), Galiuro (original), and Pusch Ridge Areas. Current management emphasis is to encourage "no trace" camping and to provide information to the wilderness visitor.

Although current use exceeds practical potential in some areas, there has been no direct management effort to limit use. Some limited effort has been made to better disperse the use through trail relocation and providing parking sites at trail heads.

Future Trend

Projected average annual wilderness use is displayed below. Potential wilderness use increases are assumed to increase at 3.5 percent per year.

Projected Trend Average Annual Wilderness Recreation Use

(MRVDs)				
1	2	3	4	5
254	358	505	713	1005

Projected use is in excess of capacity and current use in portions of the Pusch Ridge Wilderness may already exceed capacity. The Chiricahua and Galiuro Wildernesses are lightly utilized and data is not available for the other newly designated areas.

To provide a quality wilderness experience and prevent deterioration of the wilderness resource, the Pusch Ridge Wilderness may require some use limitations, with excess use directed to the other wildernesses on the Coronado.

VISUAL RESOURCES

The Coronado encompasses a rich variety of vegetative, climatic, and geologic zones occurring as the mountain ranges rise abruptly above desert and grassland valleys. Deep canyons, forested peaks, colorful rock formations, diverse vegetation and an occasional stream are characteristic of this scenic landscape.

In order to protect visual resources, visual quality objectives have been established. These five Visual Quality Objectives (VQOs) are defined for the Coronado as a result of combining variety classes with sensitivity levels and distance zones. They are Preservation (P), Retention (R), Partial Retention (PR), Modification (M) and Maximum Modification (MM). Appropriate degree of manipulation of the landscape varies from none in Preservation to a considerable amount in Maximum Modification. There are also two short term goals, Enhancement and Rehabilitation. Currently visual quality objectives are being met or exceeded through anticipation and mitigation of adverse impacts of management activities. Table 24 shows the current acres by visual quality objectives:

Table 24. Visual Quality Objectives

VQO	Acres	% of Forest
Preservation	372,035	21%
Retention	210,804	12
Partial Retention	494,939	29
Modification	495,767	29
Maximum Modification	152,969	9
	1,726,514	100

Future Trends

Interest and concern for scenic quality is increasing. The visual quality of lands viewed from communities, recreation sites, prominent vista points and scenic travelways will become increasingly important. Visual resource management techniques will be applied to all future projects, with specific emphasis on those areas identified as high in scenic quality or in recreation visitor use. As more recreation opportunities are supplied, it will become increasingly difficult to retain visual quality of lands viewed by recreationists.

CULTURAL RESOURCES

Southeastern Arizona has been occupied by humans for at least 12,000 years. The record of prehistoric occupation is quite complex and very poorly understood. The Forest encompasses areas occupied by several prehistoric cultures where considerable interaction and blending of cultural traits occurred. In addition, usage for many and varied purposes has taken place because of the diversity of the forest environment. Prehistoric cultures represented on the Forest include Archaic hunters and gatherers, the San Simon and Mimbres branches of the Mongollon, the Hohokam and regional variants including the Salado, the Ootam, the Dragoon, and the Trincheras cultures. Sites on the Forest are important to a better understanding of the lifeways and adaptations of these prehistoric peoples.

Late prehistoric and early historic groups who occupied the Forest include the Sobaipuri, the Pima and Papago, and the Apache. Apache use of the Forest, particularly in the Dragoon and Chiricahua Mountains, has been well-documented. The Mexican and early American periods are represented mainly by homesteads, ranching, mining and timber operations, and military occupations. Forest files contain a substantial amount of historical information.

Over 800 sites have been recorded although about 500 of these are within the proposed ANAMAX land exchange and may be removed from federal jurisdiction. Few of the inventories, however meet current standards for accuracy and there is a backlog of known sites which need to be inventoried. Only a little over 1% of the Forest has been inventoried and all of the Forest is considered to need intensive inventory. Site data have not been entered into the regional site data base. Five sites are listed on the National Register of Historic Places; the American Flag Ranch, the James Finley House, the Dragoon Springs Stage Station, the Yaqui Springs sites, and Powers Cabin. Interpretive information is present at the Sabino Canyon Center, and Palisades Work Center. A draft cultural resource overview has been prepared and completion is scheduled for 1987.

Interpretation of cultural resources has focused on signing at several historic sites. Camp Rucker, the Reef area, and Sabino Canyon provide particularly good opportunities to increase public awareness of southern Arizona prehistory and history. A number of other sites, particularly historic ones, are amenable to interpretation, both on-site and off-site.

Current cultural resources management is closely related to cultural resources legislation and includes three major aspects: inventory, evaluation, and protection.

Inventory is being accomplished through reconnaissance, sample and complete surveys to locate and record cultural resource sites. Only a little over 1% of the Forest's acreage has received an archaeological survey.

Evaluation involves examining sites in terms of their eligibility for the National Register of Historic Places. This occurs, in part, during the course of project

inventories. Properties which should have priority for nomination to the Register are being identified.

Protection efforts currently involve ensuring that cultural resources are not damaged through the activities of other Forest resource programs. Prior to ground-disturbing activities project areas are surveyed for prehistoric and historic sites. Sites located are recorded and the effects of the proposed project are mitigated by relocation, avoidance, or excavation. All surveys are co-ordinated through the State Historic Preservation Officer.

Future Trends

The Forest's cultural resources are finite and nonrenewable. Estimates of the total number of sites range from 10,000 to 20,000. The rate at which these resources will be depleted will vary depending upon the economy, the level of ground disturbing activities which cannot avoid sites and land exchanges. The cultural resources program will ensure wise use and conservation of these resources.

All sites listed on the National Register will be monitored and protected. Other sites will be protected to the extent feasible by avoidance or mitigating measures. Clearance surveys will be conducted for all ground disturbing activities.

WILDLIFE AND FISH

The wide range of elevations and vegetation provide favorable conditions for a variety of wildlife species on the Coronado National Forest. The 576 vertebrate species recorded here include 113 mammals, 19 amphibians, 90 reptiles, 33 fishes, and 321 birds. Of the bird species, 190 breed locally.

Species found commonly on the Coronado as well as elsewhere in the Southwestern United States are mule deer, pronghorn antelope, black bear, Merriam's turkey, Stellars jay and black-tailed jackrabbit. Species unique to the Forest (and southeastern Arizona, southwestern New Mexico and Mexico) include Coues white tailed deer, coatimundi, Mexican chickadee, elegant trogon, Arizona ridge-nosed rattlesnake, Apache fox squirrel and the javelina.

Threatened or Endangered Species

Animals

Sixty-four species of wildlife on the Coronado are classified as threatened or endangered by federal or state wildlife agencies. The Coronado is actively involved with the recovery efforts of several federally listed species. The consultation process with the U.S. Fish and Wildlife Service for threatened and endangered species is in progress. No critical habitats have been designated for any of these species.

The Forest also cooperates with the Arizona and New Mexico wildlife agencies in the management of habitat for state listed species. These species and their classifications are listed in Table 25.

Table 25. Threatened and Endangered Animal Species

	Federal [1] Classification	Arizona [2] Classification	New Mexico [3] Classification
Mammals			
Southern yellow bat			Group II
Black-tailed prairie dog		Group I	
White-sided jackrabbit			Group I
Mt. Graham spruce squirrel		Group IV	
Mexican wolf	Endangered	Group I	Group I
Jaguar	Endangered	Group I	Group I
Desert bighorn sheep		Group III	Group I
Birds			
Great egret		Group IV	
Snowy egret		Group IV	
Black-bellied whistling duck		Group IV	
Gray hawk		Group II	
Black hawk		Group III	Group II
Osprey		Group III	
Bald eagle	Endangered		Group II
Peregrine falcon	Endangered	Group III	Group I

Table 25. Threatened and Endangered Animal Species (Continued)

	Federal 1/ Classification	Arizona 2/ Classification	New Mexico 3/ Classification
Birds (Continued)			
Aplomado falcon	Proposed Endangered	Group I	Group II
Gould's Turkey	Endangered	Group II	Group I
Masked bobwhite quail		Group IV	Group II
Buff-collared nightjar			Group II
Spotted owl		Group IV	Group II
Costa hummingbird		Group IV	Group II
Blue-throated hummingbird			Group II
Lucifer hummingbird		Group IV	Group II
Violet-crowned hummingbird		Group IV	
Berylline hummingbird			Group II
White-eared hummingbird			Group II
Broad-billed hummingbird		Group IV	
Elegant trogon			Group II
Gila woodpecker			Group II
Rose-throated becard		Group III	
Tropical kingbird		Group III	Group II
Thick-billed kingbird		Group III	
Buff-breasted flycatcher		Group III	Group I
Northern beardless tyrannulet		Group IV	
Black-capped gnatcatcher		Group IV	
Sprague's pipit			Group II
Gray vireo			Group II
Bell's vireo			Group II
Varied bunting		Group III	Group II
Baird's sparrow		Group III	
Five-striped sparrow			Group II
Yellow-eyed junco			Group II
McCown's longspur			
Fishes			
Mexican stoneroller	Caterory II	Group II	
Arizona trout	Threatened	Group III	
Gila topminnow	Endangered	Group III	
Gila chub	Category I	Group III	
Spikedace	Proposed Threatened	Group III	
Sonoran chub		Group III	
Reptiles			
Desert massasauga		Group IV	
Arizona ridge-nosed rattlesnake	Category II	Group IV	
Vine snake		Group IV	
Sonora mountain kingsnake			Group II
Desert hook-nosed snake		Group IV	
Green rat snake			Group II
Mexican garter snake		Group III	Group II
Gila Monster	Category II		Group I
Mountain skink		Group IV	Group II
Giant spotted whiptailed lizard			Group II
Bunchgrass lizard			Group II
Amphibians			
Huachuca Tiger salamander		Group II	
Colorado river toad			Group II
Plains narrow-mouthed toad		Group IV	
Tarahumara frog	Category II	Group II	

Table 25. Threatened and Endangered Animal Species (Continued)

1/ "Endangered species" means any species which is in danger of extinction throughout all or a significant portion of its range.

"Threatened species" means any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

"Proposed Endangered" means the species has been listed in the Federal Register for formal status as endangered. A final determination will be made upon receipt of public and agency comments.

"Proposed Threatened" has a similar meaniang as "Proposed Endangered" except the species would be listed as threatened.

Category I means the species is a potential candidate for formal listing by the U.S. Fish and Wildlife Service as threatened or endangered; sufficient evidence is on hand to support such a listing.

Category II means the species is a potential candidate for formal listing by the U.S. Fish and Wildlife Service but further information is needed to determine the appropriateness of such a listing.

Species listed and definitions from: U.S.F.W.S. 1982. Endangered species of Arizona and New Mexico. U.S. Fish & Wildlife Service, Region 2, Albuquerque, NM. 72pp

2/ Group I are species that are known or suspected to be extinct in Arizona but still exist elsewhere in the United States or Mexico.

Group II are species whose occurrence in Arizona is in jeopardy without recovery efforts or species for which there are no recent records.

Group III are species whose occurrence in Arizona could be in jeopardy in the near future.

Group IV are species for which there is a moderate threat to their habitats. With increased habitat pressures or declines in population these species would be good Group III candidates.

Species listed and group definitions are from: Arizona Game and Fish Commission. 1982. Threatened native wildlife in Arizona, Ariz. Game and Fish. Dept. Publication. 12pp.

3/ Group I species whose prospects of survival or recruitment in the state are in jeopardy.

Group II species whose prospects of survival or recruitment in the state may become in jeopardy in the foreseeable future.

Species listed and group definitions are from New Mexico Department of Game and Fish, 1985. Listing of endangered species and subspecies in New Mexico. State Game Commission Regulation No. 624, 4 pp.

Plants

At this time there are no federally classified plants on the Coronado. Forty-nine species, however, are being considered by the U.S. Fish & Wildlife Service for formal status or are considered sensitive by the Forest Service. These species are given in Table 26.

Table 26. Sensitive Plant Species of Arizona

Name	Status
Agave parviflora	2
Agave scottii var. terleasei	2
Allium gooddingii	1
Amsonia grandiflora	2
Amsonia kearneyana 1/	1
Aster lemmoni	1
Cereus greggii	2
Cheilanthes arizonica	2
Cheilanthes pringlei	2
Choisya mollis	2
Corypantha recurvata	2
Corypantha robbinsorum 1/	Proposed Threatened
Corypantha scheeri var robustispina 1/	1
Cynanchum wigginsii	S
Dalea tentaculoides	1
Desmanthus bicornutus	1
Echinocereus ledingii	S
Erigeron arizonicus	S
Erigeron eriophyllus	1
Erigeron kuschei	1
Erigeron lemmoni	2
Erigeron pringlei	2
Euphorba plummerae	S
Fraxinus gooddingii	S
Graptopetalum batramii	2
Ipomoea lemmoni	2
Lilaeopsis recurva	2
Lilium parryi	2
Manihot davisae	S
Margaranthus lemmoni	2
Neolloydia erectocentra var. erectocentra	2
Notholaena lemmoni	2
Pectis imberbis	2
Penstemon discolor	1
Perityle cochisensis	S
Phaseolus supinus	S
Pherotrichis balbisii	S
Polemonium pauciflorum hinkleyi	2
Polygonum fusiforme	2
Ranunculus arizonicus	S
Rumex orthoneurus	1
Senecio huachucanus	1
Sophora arizonica	S
Spiranthes graminea	S
Streptanthus carinatus	S
Streptanthus lemmoni	2
Talinum marginatum	2
Tumamoca macdougalii	Proposed Endangered
Vauquelinia pauciflora	1

1/ Small amount of habitat on National Forest.

Status

1 : potential candidate for formal listing by the U.S. Fish & Wildlife Service as threatened or endangered; sufficient evidence is on hand to support such a listing.

2 : potential candidate for formal listing by the U.S. Fish & Wildlife Service but further information is needed to determine the appropriateness of such a listing.

Proposed endangered:
The species has been listed in the Federal Register for formal status as endangered. A final determination will be made upon receipt of public and agency comments.

Proposed threatened:
Same definition as proposed endangered except formal status would be threatened.

This list of species and definitions are from the September 27, 1985, Notice of Review Amendments.

S : a Region 3 (U.S. Forest Service) sensitive species not on the Federal Notice of Review of September 27, 1985. Forest Service policy is to keep these species from federal or state listing through coordination in land managing activities.

In addition, 10 species of plants occurring in New Mexico are considered rare or endemic. They occur on the Forest and should be looked for when doing land management activities. These species are:

Table 27. Sensitive Plant Species of New Mexico

Name	Status
Agastache pallidiflora mearnsii	NM-T
Aletes filifoluis	NM-1
Cereus greggii	NM-T
Corypantha scheeri var. scheeri	NM-E
Escobaria orcuttii	NM-T
Ferocactus wislizenii	NM-1
Ipomopsis pinnatifida	NM-T
Mammillaria wrightii var. wilcoxii	NM-1
Penstemon dasphyllus	NM-1
Vauquelinia pauciflora	NM-T

The status of these plants has been proposed by the New Mexico Native Plants Advisory Committee in A Handbook of Rare and Endemic Plants of New Mexico, 1984, 291 pp. Definitions for these classifications are:

Status:

NM-E : taxon restricted to a few sites in New Mexico and/or is in threat of extinction or rapidly declining; biologically endangered.

NM-T : taxon is relatively restricted in New Mexico or has the potential for rapid extinction; biological threatened.

NM-1 : taxon is common in New Mexico but wholly endemic to state; commercially exploited; of restricted distribution in New Mexico; or widely distributed but of local occurrence in New Mexico and subject to threats; State Priority-1.

Management Indicator Species

Of the animal species found on the Coronado, 32 were selected as management indicator species. Several species groups are represented whose habitats could be affected by Forest Service management activities. These species and their current levels of occupied habitat are displayed in Table 28. Until better information is available regarding minimum viable populations, it is assumed currently occupied habitat represents the minimum desirable situation for various wildlife species.

Management indicator species were selected so that the effects of management could be estimated and so that specific habitat objectives could be developed for different habitat types. Because there are so many species on the Coronado, not all species could be used.

The species selected were those that are the easiest to determine population trends for; those that best lend themselves to interpretations of population change relative to habitat conditions; and those that best lend themselves to interpretations of species mix relative to habitat conditions.

Table 28. Management Indicator Species

	Current Occupied Habitat
Cavity Nesters	
Coppery-tailed trogon	12,190 acres
Sulphur-bellied flycatcher	No data
Other primary and secondary cavity nesters	Forest-wide
Riparian Species	
Gray hawk	567 acres
Blue-throated hummingbird	No data
Coppery-tailed trogon	12,190 acres
Rose-throated becard	752 acres
Thick-billed kingbird	1200 acres
Sulphur-bellied flycatcher	No data
N. beardless tyrannulet	1270 acres
Bell's vireo	No data
Black bear	641,113 acres
Species Needing Diversity	
White-tailed deer	1,430,071 acres
Merriam's turkey	422,901 acres
Coppery-tailed trogon	12,190 acres
Sulphur-bellied flycatcher	No data
Buff-breasted flycatcher	Incomplete data
Black bear	641,113 acres
Species Needing Herbaceous Cover	
White-tailed deer	1,430,071 acres
Mearns quail	225,410 acres
Pronghorn antelope	57,692 acres
Desert massassauga	389 acres
Baird's sparrow	No data
Species Needing Dense Canopy	
Bell's vireo	No data
Northern beardless tyrannulet	1,270 acres
Gray hawk	567 acres
	Essential Habitat
Game Species	
White-tailed deer	1,430,071 acres
Mearns quail	225,410 acres
Pronghorn antelope	57,692 acres
Desert bighorn sheep	72,458 acres
Merriam's turkey	422,091 acres
Black bear	641,113 acres
Special Interest Species	
Mearns quail	225,410 acres
Gray Hawk	567 acres
Blue-throated hummingbird	No data
Coppery-tailed trogon	12,190 acres
Rose-throated becard	752 acres
Thick-billed kingbird	1200 acres
Sulphur-bellied flycatcher	No data
Buff-breasted flycatcher	Incomplete data
Northern beardless tyrannulet	1270 acres
Five-striped sparrow	18,279 acres

Table 28. Management Indicator Species (Continued)

Threatened and Endangered Species	
Desert bighorn sheep	72,458 acres
Gray Hawk	567 acres
Peregrine falcon	No data
Blue-throated hummingbird	No data
Coppery-tailed trogon	12,190 acres
Rose-throated becard	752 acres
Thick-billed kingbird	1200 acres
Sulphur-bellied flycatcher	No data
Buff-breasted flycatcher	90 acres
Northern beardless tyrannulet	1270 acres
Bell's vireo	Incomplete data
Baird's sparrow	No data
Five-striped sparrow	18,279 acres
Mexican stoneroller	3.3 miles
Arizona trout	19.6 miles
Gila topminnow	.5 miles
Gila chub	4.4 miles
Sonora chub	3.7 miles
Desert massassauga	389 acres
Twin-spotted rattlesnale	46,351 acres
Arizona ridge-nosed rattlesnake	28,175 acres
Huachuca tiger salamander	650 acres
Tarahumara frog	1339 acres
Wester barking frog	891 acres
Arizona tree frog	no data
Spikedace	no data
Mt. Graham spruce squirrel	2603 acres
Gould's turkey	no data

One exotic species, the feral pig, occurs in the Peloncillo Mountains portion of the Forest. Numbers of animals are unknown.

Current direction for wildlife and fish management includes (1) coordination of wildlife and fish needs with other resource activities, (2) direct habitat improvement and maintenance; (3) management of threatened and endangered species habitat; and (4) cooperative efforts with state and federal wildlife agencies and interested publics. Wildlife habitat improvement funds are not sufficient to assure maintenance of structural and nonstructural improvements. Critical wildlife habitats have not been identified to allow coordination of other uses in these areas.

Future Trends

Projected uses for consumptive and non-consumptive wildlife and fish recreation are displayed in Table 29.

Table 29. Current and Potential Wildlife Situation

	Current Use 1980 (MRVD)	Projected Trend (Average Annual Use by Period 5) Percent Change Past 10 years	Meet State Goals	Need Based on Population Trend
Wildlife 1/	235	+75%	537	633
Fishing 1/	82	+20%	204	221

1/ Includes consumptive uses (hunting and fishing) and non-consumptive uses (birdwatching, general observation, photography, etc.)

Increases in big game activity depend on permit issuance by state agencies. Increases in small game, fishing and non-game follow human population projections.

RANGE

Approximately one and one half million acres of the Coronado are suitable for grazing and available under current management direction. Available acreage will vary by a limited amount with prescriptions selected, as the size and number of research natural areas, developed recreation areas, and protected riparian areas varies.

Grazing is currently limited to recreation livestock in the Pusch Ridge Wilderness, a large portion of the Chiricahua Wilderness, the high elevation recreation areas in the Catalina and Penaleno Mountains, several developed recreation areas, selected key riparian areas, and all research natural areas. The remainder of the Forest is grazed where soils, topography and vegetation are suitable.

The goal of range management is maintenance of a healthy ecosystem with a stable soil, while producing livestock products at a level consistent with other resources and uses.

The Coronado, like other Southwestern National Forests, has a long history of stocking adjustments. Although these ranges have been grazed since the Spaniards introduced livestock in the early 1600's, significant range deterioration did not occur until a great infusion of Texas cattle following the Civil War. During an unusual wet cycle in the late 1800's, cattle numbers in Southern Arizona were allowed to build up to several million. Severe drought followed the boom years and the area was littered with dead cattle about the turn of the century. To this day ranges show signs of this stress.

When the National Forest was created in 1902, much land was ungrazed due to a lack of water. The grazed portion of the range was severely overgrazed. Efforts of the Forest Service have been to bring about a balance between capacity of the land and permitted numbers through range development, improved management, and reduction in numbers. Currently 1,266,512 acres are in satisfactory condition and 244,049 acres are unsatisfactory. Permitted use in 1981 was 398,000 AUM's and grazing capacity was estimated at 326,000 AUM's. Table 30 shows the current status of range management.

Table 30. Status of Range Management on the Coronado (1981)

District	Allotment Analysis Status		Management Plan Status			On Ground Mgmt. Status	
	OK	Needs Revision	None	Implemented	Needs Revision	None	Sat.	Unsat.
Douglas (total 55)	35	20	0	37	34	18	44	11
Nogales (total 39)	10	27	2	30	25	9	30	9
Sierra Vista (total 48)	16	31	1	28	24	20	17	31
Safford (total 49)	21	28	0	33	26	16	28	21
Santa Catalina (total 17)	13	4	0	15	4	2	13	4
Forest Totals (208 allotments)	95	110	3	143	113	65	132	76

Future Trends

Under existing management practices, range conditions on the Forest will not change significantly. Forage production and utilization studies, stocking adjustments and implementation of allotment management plans are made on approximately ten allotments per year. Continuing turnover in permittees and the need for plan revision results in a net gain of about 5 AMPs per year. Of the 208 grazing allotments currently being utilized, 76 exhibit an unsatisfactory management situation.

Potential grazing capacity in the MAX Grazing Capacity Benchmark is projected to grow from about 350 MAUM's in Period 1 to about 400 MAUM's in Period 5. Based upon past trends, it can be assumed that the demand for permitted use will equal or exceed the capacity in all time periods.

TIMBER AND FOREST PRODUCTS

Forest land was screened to determine suitability for timber production as displayed in Table 31. The first screening was for separation of forest and nonforest land. The next screen was to determine the administrative availability of land that passed the first test. Lands that are not legislatively or administratively withdrawn were considered available. The available land was then screened for technological suitability to determine whether technology is available to permit timber harvest without irreversible environmental damage.

Under current management direction, the uneven-aged system of management is applied. Timber management for a sustained yield of timber products is a marginal opportunity under the present economic conditions. Timber management is applied to enhance wildlife and recreational values.

Through use of group or individual tree selection, new stands are cultured through natural regeneration.

Table 31. Land Classification for Timber

Classification	Current Acres
1. Nonforest Land (includes water)	1,611,426
2. Forest Land	115,088
3. Withdrawn from Timber Production 1/	48,484
4. Physically Unsuitable	43,531
5. Inadequate Information 2/	0
6. Tentatively Suitable (2 minus 3+4+5)	23,073

1/ Areas withdrawn by an Act of Congress, the Secretary of Agriculture, or the Chief of the Forest Service.

2/ Current information inadequate to project responses to management.

There are no large sawmills within reasonable truck-hauling distances. Sawmills exist at Safford (annual capacity of 200 MBF), on the Catalina Mountains (annual capacity of 175 MBF), and Double Adobe (capacity 80 MBF). The total local mill capacity is about 500 MBF per year. Under current management the Forest could provide an annual sustained volume of about 2000 MBF. Actual harvest has usually averaged less because of limited markets. The Treasure Park Sale (1.0MMBF) was advertised for sale in 1981, but did not attract any bidders. Most sales are small (less than 300MBF) and are purchased by local sawmills or fuelwood interests.

Fuelwood

Requests for fuelwood use increased from about 1200 cords in 1977 to over 13,000 cords in 1980. At this point a lottery system was instituted because demand was in excess of supply. Given only minimal constraints placed on other resources, the potential annual sustained supply is estimated near 5000 cords. With other resource constraints, this figure could range as low as 1300 cords by Period 5. Currently fuelwood sales are made to provide benefits to multiple resources and projected harvest would be 2500 cords per year by Period 5. Accessible areas containing dead and down firewood for personal use are rapidly being depleted.

Future Trends

It can be anticipated that the future need for fuelwood will increase at least proportionately to the population growth. Due to poor accessibility and small volumes present, demand for lumber and paper products will not keep pace with national trends, although the need can be expected to rise. Growing concern over air pollution in metropolitan areas may eventually lead to ordinances restricting the use of wood stoves and fireplaces during some periods of the year.

The existing annual sawmill capacity within the Coronado's zone of influence will not change significantly. Unless another market can be developed, the potential harvest levels for sawtimber cannot be marketed. If commercial sawtimber sales offered exceed sawmill capacity over time, new fuelwood industries may be encouraged.

The Forest will not be able to meet the projected future demand for dead and down or green firewood. Some of the future firewood needs may be met by offering commercial and personal green firewood sales from the available sawtimber volumes not utilized by local sawmills. Even if some sawtimber volumes are utilized as fuelwood sources and access to potential fuelwood areas is increased, it is unlikely that the Forest can meet the long-term fuelwood needs in Southeast Arizona.

PLANT AND ANIMAL DIVERSITY

Due to the wide variation in soils and climate, vegetation is highly diverse on the Coronado. Plant communities range from Sonoran desert scrub lands on the drier, lower elevation through grasslands, oak woodlands, ponderosa pine, and Engelmann spruce on the high mountain peaks. Table 13 shows existing acres by vegetative groups.

Vegetative diversity along with physical factors such as climate determine animal diversity. Species occurrence as well as management indicator species are discussed in the Wildlife and Fish Habitats Section of this Chapter.

SOIL AND WATER

The entire Forest is within the Lower Colorado River Basin. Minor amounts of water are drawn from the basin by windmills for use by wildlife and domestic livestock. Annual water yield from the Coronado varied over the last 10 years from 79,257 to 400,455 acre feet per year (AF/yr). Expected total "average" yield is 146,200 AF/yr under current watershed conditions. Approximately one-half of the water yield comes from summer storms of high intensity and short duration which result in a high sediment load. Estimated maximum yield the Forest can produce that is within quality standards is 108,000 AF/yr.

Pollution of streams, ponds, and lakes is of major concern. Sedimentation is the major pollutant and generally follows localized heavy storms. This pollution generally occurs during the summer months when high intensity thunderstorms are frequent. Improper livestock grazing, off-road vehicle use, and poorly located and/or maintained roads are the more prevalent activities contributing to nonpoint pollution because of soil loss. Numerous unstable channels throughout the Forest add to the sedimentation problem. Mine drainage from abandoned mines into ephemeral streams are the only known point pollution sources.

Efforts are currently focused on integrating soil and water protection with current and future uses and activities through standards for livestock grazing, soil loss, riparian restoration, revegetation, fire suppression activities, erosion control, and off-road vehicle use.

It is expected that water quality could be improved by: 1) treatment of land by measures such as reseeding, pitting, and water spreading; 2) minimizing overgrazing; 3) channel stabilization 4) reconstruction of system roads; and 5) closure and revegetation of nonessential roads and travelways.

Past resource use and activities have created unacceptable soil erosion and reduced water quality on some watersheds on the Forest. Soil productivity has been reduced on these areas and continuing erosion further reduces potential production. Generally average annual soil erosion ranges from 1.00 to 5.29 tons per acre on the Forest. Watershed condition is estimated to be unsatisfactory on 31 percent of the Forest acres.

Future Trends

Surface water rights necessary to secure water for wildlife, range, and recreation developments will be difficult to appropriate. Small wells for domestic and livestock uses will be available in some locations. It may be necessary to purchase water rights or transfer water rights currently held by the Forest Service to obtain larger quantities of water if needed. Where water cannot be appropriated, trick tanks could be used.

Underground water basins will not be significantly affected by wells located on the Forest in the foreseeable future. Use should remain fairly constant and will be confined to providing water for recreation, administrative use, wildlife and domestic livestock.

The need for productive Forest rangeland soils will continue through Period 5 although specific uses may change. Past resource practices have decreased productivity, thereby necessitating the need to reverse or stabilize downward trends. Currently 535,172 acres have been identified where soil loss exceeds estimated tolerance limits as measured by ineffective ground cover.

Water quality and soil productivity depend on the health of the watershed. It is necessary to strive for improving unsatisfactory watershed condition acres to satisfactory or better condition by the year 2030.

Intensified range management and direct and indirect watershed improvement could improve unsatisfactory watershed condition 60% over the current situation.

MINERALS

Removal of minerals, energy resources and common variety materials impact the natural environment and result in conflicts with other resource protection, uses, and activities. The full potential regarding the Forest is estimated from information provided by many sources.

Table 32 displays acreages of probable occurrence of minerals by potential classes. The ratings express a range from known mineralization and expected development to unknown mineralization with no expected exploration or development. Acres of locatable and leasable minerals overlap in some areas which causes duplication of acreages in some categories.

Table 32. Acres of Probable Mineral & Common Variety Occurrence

Mineral Potential Rating	Leasable Minerals	Percent in Wilderness	Locatable Minerals	Percent in Wilderness	Common Variety	Percent in Wilderness
Demonstrated Favorable for Production	-	-	117,757	16	15,961	0
Demonstrated Favorable for Development	-	-	970	0	-	-
Demonstrated Favorable for Exploration	-	-	107,379	24	1,020	0
Theoretically Favorable for Exploration	106,628	1/	100,590	1/	56,047	0
Theoretically Favorable for Prospecting	82,471	38	826,821	13	63,803	0

1/ Less than one percent

The greatest restriction to access of areas of probable mineral occurrence is the legislative withdrawal from mineral entry or leasing of all wilderness areas. Table 32 depicts the percent of area on each mineral potential rating category that falls within existing wilderness. Generally speaking, there is very little "demonstrated favorable" area within wilderness. The exceptions to that are that most of the Miller Peak Wilderness is demonstrated favorable for production of locatable minerals and most of the Mt. Wrightson Wilderness is demonstrated favorable for exploration of locatable minerals. No significant areas of wilderness are rated theoretically favorable for exploration. Thirteen percent of forest areas classified as theoretically favorable for prospecting for locatable minerals are within existing wilderness (mostly in the Santa Teresa and Galiuro

Wildernesses). The largest percentage of any category within wilderness (38%) is that of theoretically favorable for prospecting for leasable minerals. Most of that area is potentially favorable for geothermal prospecting in the Pusch Ridge and Chiricahua Wildernesses--which has attracted little or no interest to the present time.

Forest initiative administrative withdrawals (e.g. administrative sites, campgrounds) included in the current withdrawal review program, are calculated to include 8,252 withdrawn acres and are on lands that have been rated "theoretically favorable" for locatable minerals. This includes 2,950 acres for the Mt. Hopkins withdrawal that are now part of the Mt. Wrightson Wilderness. No "demonstrated favorable" lands are included in any of these withdrawals. Of the total, 3,911 acres (including the 2,950 for Mt. Hopkins) are recommended for revocation. Addition of that total to the wilderness acres would result in no change to the percentage figures presented in Table 32. In other words, withdrawals over which the Forest has any discretion affect only relatively minute areas with probable mineral potential.

A listing of mineral commodities found within the Coronado National Forest follows. Critical and strategic minerals are denoted by an asterisk.

Copper *	Lead *	Zinc *	Limestone	Asbestos
Gold	Silver *	Molybdenum	Iron	Gemstones
Tungsten *	Uranium	Fluorspar *	Beryllium *	Mica *
Manganese *	Gypsum	Antimony *	Quartz	Barite
Aluminum *				

Under current direction the Forest takes action on operating plans for locatable minerals. Lease application for leasable minerals are processed in a timely manner. Common variety material permits are issued and administered in accordance with approved plans. All operating plans, leases, and permits are issued and administered subject to current Federal regulations. Mineral validity contests are undertaken where detrimental surface disturbance is possible or is occurring and where mining claims are suspected of being invalid.

Prospecting, exploration and mining of locatable minerals is accomplished under Operating Plans which insure surface resources are protected to the extent possible and adverse impacts are mitigated. Locatable mineral cases from 1981 through 1984 are displayed in Table 33. These cases have remained relatively constant.

There are 12,375 acres of National Forest land that have outstanding mineral rights to the San Carlos Indian Reservation (10,650 acres) and scattered private parties (1,725 acres).

There are 538 acres of National Forest land acquired under the Weeks Act. These are areas that the Federal Government has complete control over all minerals. All minerals, locatable and energy, are leasable with Forest Service consent. Consent may be withheld because of nonmineral values for which the areas were acquired. This would be areas appropriated under the Land & Water Conservation Fund (L&WCF) for recreational areas.

Table 33. Mining Cases Processed for Locatable Minerals

Year	Ranger District				
	Douglas	Nogales	Sierra Vista	Safford	Catalina
84	24	44	37	20	11
83	24	44	37	12	11
82	45	34	14	14	12
81	42	30	20	29	29

Contained within the lands of the Coronado National Forest are all or parts of 40 mining Districts. Mineral production from some Districts dates back to Spanish times, but the bulk of the production occurred in the late Nineteenth and early

Twentieth Centuries. Much of the production has been of base metals (copper, lead, zinc) and precious metals (silver, gold) from numerous small but high-grade deposits. Data compiled by the Arizona Bureau of Geology and Mineral Technology in Bulletin 194, "Metallic Mineral Districts and Production in Arizona", indicate that approximately 100 million pounds of copper, 245 million pounds of lead, 273 million pound of zinc, 83,000 ounces of gold, and 13.5 million ounces of silver have been produced from mines in these mining Districts. See Table 34. Major undeveloped metal deposits within the Forest include the Helvetia-Rosemont deposit with 340 million tons of low-grade copper and molybdenum ore reserves, Red Mountain with about 100 million tons of copper-molybdenum ore reserves, and Oracle Ridge with 11 millions tons of copper-molybdenum ore reserves. Also within the Forest near Red Mountain is a major undeveloped deposit of alunite, which is a leasable mineral with potential as an aluminum resource.

The current level of mineral activity for the Coronado National Forest consists predominantly of prospecting and exploration, with small-scale development and production from some low-grade gold-silver deposits. The amount of annual production from each operation and the extent of identified reserves is generally proprietary information and not available to the Forest. The operations are usually short term and typically involve cyanide leaching of material excavated from shallow exposures or the dumps and tailings of past mining.

Table 34. Historic Mineral Production [1/]

Mining District	Copper (lbs.)	Lead (lbs.	Zinc (lbs.)	Gold (oz.)	Silver (oz.)	Other
NOGALES RD						
1. Austerlitz	32,000	1,700	-	2,500	44,000	
2. Oro Blanco	3,851,000	56,946,000	47,757,000	43,500	4,340,000	47,000 lbs., manganese 45 lbs., U_3O_8
3. Pajarito	4,000	139,000	300	100	21,000	108 lbs., U_3O_8 14 lbs., V_2O_5
4. Patagonia	759,000	378,000	1,000	700	45,000	
5. Querces	2,604,000	-	-	400	13,000	
6. Washington Camp	33,137,000	38,406,000	74,643,000	9,000	2,994,000	
7. Harshaw	3,659,000	83,317,000	104,301,000	1,800	4,202,000	10,057,000 lbs., manganese
8. Red Rock	20,000	22,000	3,000	-	12,000	
9. Ivanhoe	37,000	157,000	-	60	23,000	19,000 lbs., manganese
10. Salero	579,000	4,462,000	155,000	5,000	202,000	
11. Mansfield	62,000	429,000	-	400	50,000	
12. Tyndall	161,000	14,754,000	6,805,000	200	238,000	
13. Duranium	-	-	-	-	-	2,700 lbs., U_3O_8
14. Old Baldy (Jackson)	37,000	-	-	-	1,000	
15. Wrightson	55,000	49,000	30,000	-	3,600	
16. Cave Creek	26,000	200	-	-	6,300	
17. Greaterville	7,000	652,000	11,100	300	16,800	

Table 34. Historic Mineral Production [1/] (Continued)

Mining District	Copper (lbs.)	Lead (lbs.)	Zinc (lbs.)	Gold (oz.)	Silver (oz.)	Other
18. Helvetia-Rosemont	37,371,000	378,000	1,146,000	1,300	409,000	26,000 lbs., molybdenum
SIERRA VISTA RD						
19. Bluebird	100	-	-	-	-	6,550 short ton units, tungsten
20. Hartford	180,000	1,193,000	746,000	400	60,000	28,500 lbs., manganese
21. Reel	-	-	-	-	-	12,350 short ton units, tungsten
22. Parker Canyon	200	500	-	-	100	
DOUGLAS RD						
23. Whetstone	500	-	-	-	-	1,000 short ton units, tungsten, 215 lbs., U_3O_8
24. Mine Canyon	76,000	-	-	-	1,600	
25. Middle Pass	2,503,000	391,000	8,390,000	500	130,000	1,300 lbs., molybdenum
26. Golden Rule	3,000	348,000	-	10,700	16,600	
27. Cottonwood Basin	-	-	-	-	-	a few tons, manganese
28. Rucker Canyon	3,000	47,000	54,000	-	1,700	
29. California	338,000	8,263,000	1,132,000	100	137,500	
SAFFORD RD						
30. Clark	7,000	17,000	-	-	1,000	
31. Black Hawk	-	-	-	-	-	230,000 lbs., manganese
32. Black Beauty	-	-	-	-	-	
33. Golandrina	-	-	-	-	-	
34. Aravaipa	1,906,000	34,492,000	27,863,000	4,400	363,000	
35. Rattlesnake	-	-	-	100	1,400	
SANTA CATALINA RD						
36. Little Hills	5,673,000	53,000	-	300	15,000	
37. Oracle	16,000	125,000	-	800	33,000	21,020 short ton units tungsten
38. Burney	81,000	85,000	80,000	-	6,000	
39. Marble Peak	6,337,000	81,000	37,000	300	103,000	
40. Catalina	415,000	200	-	-	-	

Source:
1/ Keith, S. B., and others, 1983, Metallic Mineral Districts and Production in Arizona: Arizona Bureau Geology and Mineral Technology, Bul. 194.

NOTE: Some of the reported totals are from patented mining claims, but the source of the data does not differentiate according to land status.

Oil and gas and geothermal resources on the Forest are at this time speculative. Most of the oil and gas interest is associated with the hypothetical Overthrust Belt that may extend through south-central Arizona and with the northwestern reaches of the Pedregosa Basin in southeastern Arizona.

The number of lease applications being processed dropped, during 1984. Many of the lease applications are now being considered under simultaneous procedure. To date the Forest has processed 344 lease applications, involving 176,024 acres. This total does not actually mean that each one has been approved for leasing.

Future Trends

The current interest in mineral prospecting, exploration, and development coupled with potential for production of energy minerals on the Forest will further affect the minerals management workload.

The impact of mineral activities is expected to increase in the future as evidenced by the fact that 136 cases were handled in 1984 and resource managers estimate 500 cases annually by 2030.

LANDS AND SPECIAL USES

Land Acquisition

Included within the Forest boundary are private lands, including mineral patents, and lands administered by other agencies. The Forest Service can acquire land through exchange, purchase, and donations.

The purchase program results from the Land and Water Conservation Fund (L&WCF) which provides for acquisition of lands within the following categories: 1) Congressionally designated areas; 2) wilderness; 3) threatened and endangered species habitat; and 4) recreation acquisition composites. Only 195.67 acres of land were purchased in the previous decade.

The authorities to accept donations are applicable to any of the lands that meet the acquisition criteria for the L&WCF.

In order to make adjustments in the landownership pattern for administrative purposes, some Federal lands are identified for exchange. In identifying these lands, the Forest Service considers the following criteria: 1) lands needed for community development; 2) isolated tracts; 3) lands not suitable for National Forest purposes; 4) lands which contribute to consolidating of Public Lands; 5) lands whose acquisition improves management, benefits specific resources or increases management efficiency; and 6) lands meeting overriding public needs.

Lands desirable for acquisition by the Forest Service should meet one or more of the following ten criteria: 1) lands in wildernesses; 2) habitat for T&E species; 3) high recreation potential; 4) wetland, riparian areas and other water oriented lands; 5) lands that contain unique natural or cultural values; 6) lands that will improve public land management, meet specific administrative needs or benefit other Forest programs; 7) lands that provide needed access, or protect public lands from fire or trespass, or prevent damage to public land resources; 8) lands needed for rehabilitation or stabilization to restore productivity; 9) lands needed to meet programs prescribed or endorsed by acts of Congress or the Department of Agriculture; and 10) consolidate ownership to improve management or meet research needs.

Anamax Mining Company has proposed an exchange of lands to facilitate production of copper ore in the northern Santa Rita Mountains of the Coronado National Forest. The Federal lands selected by the mining company, totaling approximately 13,000 acres, surround Anamax's privately owned patented mining claims and would be utilized during an eventual mining operation for overburden tailings, milling and processing. All but about four sections of the selected lands are currently classified as available for exchange.

In return for those lands Anamax has offered private lands of equal value (though lesser acreage 5000+ acres) in twenty-two areas across the State of Arizona. All are within the boundaries of National Forests and are classified as desirable for National Forest purposes.

The Madera Canyon, Santa Catalina, Huachuca Mountain, Chiricahua and Dragoon recreation acquisition composites have identified 10,094 acres desirable for purchase with L&WCF funds. The last three composites listed were never approved, but the reports were completed and reviewed by Department of Interior personnel prior to the abolishment of the Heritage Conservation and Recreation Service. The availability of L&WCF funds has been very limited in recent years and is expected to continue so.

At present 33,330 acres of National Forest land have been identified as available (base) for exchange on the Forest. 42,125 acres of other ownership within forest boundary as desirable for acquisition, with the remaining 24,749 acres of non-National Forest lands being undesirable for acquisition. About a dozen land exchanges are currently in process on the Coronado. Continued emphasis on land exchange as the primary means of land adjustments is expected to continue into the foreseeable future. There will be numerous opportunities to improve forest management opportunities through land exchange.

Rights-of-Way

Rights-of-way are needed to assure public access and permit management of resources. While some landowners have cooperated in access, including some donations, some private landowners both within and outside the Forest boundaries are increasingly blocking access. The problem is becoming acute because of land development with the increasing popularity of Southeastern Arizona.

The Forest needs to acquire over 1,000 miles of road rights-of-way in order to assure adequate access for public and administrative use. Local counties and other agencies may acquire a portion of these rights-of-way. Adjacent landowners can be expected to continue to further restrict public access.

Land Line Location

The interspersion of private lands within the Forest boundary and development of private lands both within and adjacent to the boundaries is resulting in increased occupancy trespass. Land line boundaries need to be located and posted to identify and prevent trespass and protect resources.

The forest has approximately 1600 miles of property boundary, not including the international boundary, boundaries with 3 National Park units, and the San Carlos Apache Indian Reservation boundary. This includes 942 miles of exterior and 658 miles of interior boundaries. About 10% have been posted to standard.

It is estimated that 1,419 miles of property boundary need to be surveyed and posted to standards.

Special Uses

Utility and communication facilities, recreation residences, concessions, rights-of-way and other uses are authorized on the Forest by special use permits.

The Forest currently administers 356 nonrecreation special use permits covering about 8000 acres (Table 35). The Radio Ridge Electronic Site has the second most users of any such site on the National Forests in the Southwestern Region.

It is estimated that demand for electronic site installations, roads and various utility lines will remain strong through 2030.

The need for electronic sites will be greatest at Radio Ridge, Bigelow, High Peak and Melendrez Pass with most use needed at Radio Ridge and Bigelow. Electronic interference problems resulting from crowding and mixing of frequencies at Radio Ridge is expected to continue.

There are two astronomical observatories of national and international renown, Mt. Hopkins and Mt. Lemmon, located on the Coronado National Forest.

Since early 1981, the Smithsonian Institution and the University of Arizona in cooperation with the National Optical Astronomy Observatories have been conducting tests on Mt. Graham in Arizona and Mauna Kea in Hawaii to document the quality of these sites for modern astronomical observatories.

The first official request was received in June 1982 from the Smithsonian Institution asking the Coronado Forest to seriously consider Mt. Graham as a unique

world site for a future major astronomical facility of broad national significance. The location was generally described as approximately five square miles above 9,600 feet in elevation.

In June 1984, the University of Arizona submitted a site and facility specific proposal to the Coronado National Forest. They have definite plans for a submillimeter telescope which is now being developed by their Steward Observatory in conjunction with the Max Planck Institute for Radio Astronomy in West Germany. The Smithsonian Institution is waiting until current studies are completed before making definite commitments.

As a result of the specific proposal made by Steward Observatory of the University of Arizona, a separate environmental impact statement is being prepared by the Coronado National Forest. The EIS will address future management direction for approximately 3500 acres being considered for an astrophysical area.

Table 35 summarizes the types and numbers of nonrecreation special uses currently permitted on the Coronado National Forest. Additional details on each permit are available in files at the Forest Supervisor's Office.

Table 35. Special Use Permits Other Than Recreation (1984)

Type	Number	Total Miles	Acres Under Permit
Agriculture (apiary, orchard, pasture, fence)	15		364
Community use (Holy Cross year-round residences)	20		43
Other Community use (school, cemetery, disposal site)	4		12
Industrial (fish hatchery, prospecting sites, motion picture and TV location)	1		4
Public information (monument, marker, sign)	3		1
Research, Study, Training (observatory, runs, experiments)	29		3,886
Transportation Use (airport, roads)	71	142.0	1,736
Utilities and Communication Uses (pipeline, powerline, electronic site, antenna)	121	384.6	1,222
Water Uses (dam, windmill, stock water, water system, wildlife water supply)	92	39.8	372.4
Non-recreation Permit Totals	356	566.4	7,640.4

Corridors

Because of the topography, requests for corridors and rights-of-way for public utilities is not a major problem. Most utilities skirt the edge of the individual mountain ranges and are confined to the foothills. Miles of utility corridors and number of electronic sites are given in Table 36.

Table 36. Major Utility Corridors and Electronic Sites

Ranger District	Miles Electrical	Miles Gas	Electronic Sites
Douglas	0.5	0	4
Nogales	0	7.2	7
Sierra Vista	0	3.4	3
Safford	5.2	0	8
Santa Catalina	0	0	8

There will probably not be a great need for major corridors for utilities across the forest, except for possible requests for electronic sites. Most existing rights-of-way for major distribution lines and pipelines are classed as corridors and prospective users will be required to use these where technically and environmentally feasible.

SPECIAL AREA DESIGNATIONS

Research Natural Areas

Research Natural Areas (RNAs) are set aside to provide and protect natural diversity in all of its forms. The areas typify important forest, shrubland, and grassland types having special or unique characteristics of scientific interest or importance. Research natural areas are established for nonmanipulative research, observation and study. The Forest currently has six established RNAs.

Although not a designated natural area the Research Ranch including 1985 acres of National Forest lands as well as State and Private is being managed as a research facility under cooperative agreement with the National Audubon Society. It includes the existing Elgin RNA and the proposed Canelo RNA.

Several examples of important biotic types are represented on the Forest. Potential areas will be managed to protect RNA values until establishment reports are completed and areas are either included in or dropped from RNA consideration. The existing and potential areas are identified in Table 37.

Table 37. Existing and Proposed Research Natural Areas Administered by the Coronado National Forest

Name	Acres	Plant Community
Existing:		
Butterfly Peak	1,000	Interior ponderosa pine
Goodding	545	Live oak savannah, riparian, hardwood
Pole Bridge	460	Apache, Arizona, Chihuahua pine
Santa Catalina	4,131	Interior ponderosa pine
Goudy	560	Southwestern white pine
Elgin	290	Desert grassland
Proposed 1/		
Canelo	350	Live oak savannah
Pole Bridge Addition	90	Apache, Arizona, Chihuahua Pine
Proposed 2/		
Scotia Canyon	1,280	Mexican oak - pine woodland
Sunnyside Canyon	600	Evergreen oak savannah
Lochiel	1,280	Grassland
Proposed 3/		
Sycamore Canyon (Gooding Extension)	1,470	Sonoran thornscrub
Pine and Ramanote Canyon	4,000	Mexican pine - oak woodland
Ramsey Canyon	1,700	Sycamore - big-tooth maple

1/ Proposed by Coronado National Forest
2/ Proposed by Arizona Academy of Science, July 1976
3/ Identified by Arizona Natural Heritage Program

PROTECTION

Air Quality

There are two Federal Class I airsheds on the forest. These airsheds are located in the Chiricahua and Galiuro Wilderness areas.

The majority of the air pollution affecting the Coronado National Forest lands, as well as the rest of Southeastern Arizona, comes from off the Forest. The sources include the City of Tucson metropolitan area, single source emitters such as copper smelters in Arizona, New Mexico, and Sonora, with lesser amounts of pollutants originating from unpaved roads and agricultural operations. Plans to expand the existing smelter at Cananea, Sonora, and construction of a new one at Nocozari, Sonora could add greatly to airborne pollutants.

Some temporary and localized pollution results from both wild and prescribed fires. Wildfires have burned an average of 4925 acres per year over the past 10 years resulting in an average particulate emission of 3,000,000,000 grams. During the 1979-1980 period, planned prescribed fires, covering 4400 acres per year, resulted in an average particulate emission of 746,000,000 grams per year. Arizona State law requires an annual burn permit to ensure compliance with air pollution standards. Prior to prescribed fire implementation the state office is contacted by telephone to ensure proper smoke dispersal conditions are present. Forest policy is to meet or exceed State and Federal air quality standards.

The Tucson Basin, which includes half of the Santa Catalinas, Rincon and Santa Rita Mountains is a nonattainment area for particulates and carbon monoxide. It also includes part of the Pusch Ridge Wilderness. The San Manuel nonattainment area, which exceeds sulfur dioxide standards, covers the northern quarter of the Santa Catalinas.

Future Trends

Current forest practices have only a minor, short term effect on air quality. Continued growth and development in Southern Arizona and Northern Mexico will probably result in reduced air quality in the near future. The forest will continue to cooperate with the State of Arizona.

Fire

The current fire management policy is to provide well planned and executed fire protection and fire use programs that are cost-effective and responsive to land and resource management objectives. To implement this policy the Coronado is divided into two fire management zones. Zone one contains man-made improvements and high resource values that will normally receive a more aggressive suppression response than Zone two.

In the other zone, where fire damage to the resource is low, appropriate suppression action will be primarily confinement, and maximum use will be made of natural barriers. In all cases life and property will be protected.

A third zone with more liberal suppression direction was proposed in the previous DEIS released in December 1982.

Elimination of the Fire Management Zone 3 was due to a recent change in National fire management policies. The Forest now has the flexibility to take the appropriate fire suppression on all Forest lands. The appropriate response for the previous Zone 3 is now applicable to larger areas. This policy change has now allowed for the combining of the previous Zone 2 and 3 into one area. This will provide for more efficient suppression responses that confine fires to national forest land while protecting life and property.

In the past 6 years, the Coronado has averaged 145 wildfires per year with an average burn acreage of about 3,400 acres. July produces the largest number of lightning fires while June produces more man-caused fires.

Prescribed fire is used primarily to reduce the litter or fuel on the forest floor, to improve or maintain vegetative and wildlife diversity and increase forage for wildlife and livestock.

Over the past 6 years prescribed burning has been cyclic, going from a low of 1000 acres to over 10,000 acres per year. The average is approximately 4400 acres treated per year.

Future Trends

Fire occurrence will probably continue to rise with increasing public use. Burned acreage will increase per fire due to appropriate suppression responses becoming more cost effective while meeting land management objectives.

Prescribed fire use will continue to increase for fuel reduction, forage and habitat improvement. Additionally planned ignitions will be utilized in wilderness areas to reduce risk from major conflagrations and to permit lightning fires to play a more natural part in the ecological processes.

Insect and Disease

Despite the presence of numerous bark beetle populations in the coniferous forest areas, damage has been limited to only minor outbreaks. Tree diseases are found in all age classes of timber. Dwarf mistletoe is prevalent on most of the ponderosa pine sites. During the past 10 years, the Coronado National Forest has not initiated any direct suppression projects. Current management emphasizes early detection of problems and the use of prevention measures such as sawtimber and fuelwood harvest. Management may include any combination of techniques from no action through silvicultural, biological, chemical and other preventative and remedial measures.

Future Trends

With modified timber management an increase in most diseases can be anticipated. In the Ponderosa Pine type cankers and root rot are common but their importance is not known. Dwarf mistletoe will increase since treatment is to harvest or kill infested trees and the Coronado is at a reduced harvest level.

FACILITIES

The Forest is responsible for construction, maintenance, and administration of various facilities. These include roads, trails, buildings, and utility systems.

Transportation System

The Coronado's road system is one of the important support elements for managing and utilizing the forest's resources. The existing transportation system consists of 140 miles of arterial roads, 170 miles of collector roads, 2506 miles of local roads and 979 miles of trails. There are also about 48 miles of State Highway within the Forest providing access to Pena Blanca Lake, Parker Lake and to the top of the Pinaleno Mountains.

483 miles of road are maintained by counties. The other 2325 miles are maintained by the Forest Service. As a result of limited funds, disinvestment (reduction in value of the road capital investment) has occurred.

Hiking is a popular activity on the Coronado trail system. Some trails are in disrepair and in need of reconstruction. Other trails are in good condition and are maintained by volunteer programs.

Currently, the Forest Service lacks legal right-of-way on some Forest Roads which provide access to the Forest. Some of these roads have been closed to public travel by private land owners adjacent to the Forest.

A conservative estimated value of the road system is shown in Table 38.

Table 38: Coronado Road Class Mileage and Value

Road Class	Miles	Unit Value in $/Mile	Total Value M$
Arterial Roads	25	500,000	12,500
	115	90,000	10,350
Collector Roads	170	35,000	5,670
Local Roads			
Service (open)	1,190	18,000	21,420
Terminal (closed)	1	10,000	10
Travelways	1,315	5,000	6,575
	2,816		56,525

In 1982 five roads were designated as Forest Highways. These were:

Swift Trail No. 34	29.5 miles
Nogales-Palominas No. 36	44.6 miles
Sonoita-Palominas No. 37	34.5 miles
Pena Blanca Lake Road No. 38	10.8 miles
General Hitchcock Road No. 39	26.5 miles

Future Trends

If current management direction is continued, the road and trail system will continue to deteriorate. Unsafe roads and trails will occur which will also create safety hazards, and resource and watershed damage.

It is estimated that the transportation system as it exists will not change. New roads will be required for inaccessible fuelwood areas. New roads might be required for access to the forest, but those roads would replace existing facilities across private land. Less than 100 miles of local roads will be closed and obliterated. Transportation planning will be completed during the first decade.

The Forest must continue to upgrade utility systems to safe drinking water and sanitary systems for administrative and public use. There may be a need for two new offices within the next 20 years. Building maintenance will be limited to that necessary to meet health and safety requirements.

Administrative Facilities

Buildings are essential to managing the Forest resources. Buildings and the utilities that serve them are located at various administrative sites throughout the Forest. Some of the offices occupied by Forest personnel are leased, but the majority of other buildings and some offices are owned by the agency. Buildings and other structures are generally in fair shape though new construction is needed at Nogales and Palisades Administrative site. A summary of buildings and structures by condition class is displayed in Table 39.

Table 39: Summary of Buildings and Structures by Primary Use and Condition Class [1/]

	Condition Class				
Type	Satisfactory	Substandard	Needs Heavy Maintenance	Replace	Historic
Housing	24	4	2	0	6
Service	9	2	0	1	0
Storage	45	8	0	2	4
Lookouts	8	0	1	1	0
Radio Building	4	0	0	0	0
Office	1	1	0	0	0
Miscellaneous	8	0	0	0	0
Totals	99	15	3	4	10

[1/] This does not include any buildings at Florida or the buildings under permit to the University of Arizona on Mt. Lemmon, or the Mt. Lemmon Snow Bowl Lodge.

The Loma Linda water system, which serves administrative, summer homes and recreational use, is in need of upgrading to provide a more consistent water supply for these users.

LAW ENFORCEMENT

The Forest plays host to an increasing number of people for both recreation and a livelihood. Many violations are associated with individuals that cut personal use fuelwood, take desert plants, or cut posts/poles. Another type of violator is the local yearlong resident who has enjoyed a freedom of cutting fuelwood without any restrictions or permits for many years, and resent increasing regulations. There are also those violators who intentionally engage in illegal cutting of fuelwood for commercial resale. Estimated annual loss could be approximately a quarter million dollars.

Fire law violations can be anticipated in all accessible areas of the Forest.

Illegal occupancy of National Forest lands continues as an increasing problem.

Off-road vehicle use in closed areas conflict with other recreation activities and contribute to resource damage. Illegal parking in areas of concentrated public use is an increasing problem.

The Forest has an abundance of archaeological and historical sites. Disturbance of sites for removal of artifacts is occurring more frequently.

Marijuana cultivation on National Forest lands is a growing problem.

The proximity of Tucson's large population to Forest lands contributes to greater incidences of theft and vandalism. Many offenses constantly occur in developed Recreation Areas on the Forest including theft of Government property, vandalism, and dumping of garbage.

Due to the Coronado's proximity to the Tucson metropolitan areas and the small communities adjacent to, or within the Forest boundary, "beer busts," "pot (drug) parties," assaults, drownings, falls and vehicle accidents are common place.

Other activities on National Forest lands include unlawful reptile hunting, the presence of undocumented aliens, and the smuggling of aliens and narcotics.

Future Trends

Arizona's location in the sun belt assures continued population growth for the State. That growth will continue to cause law enforcement problems in all areas. An upswing in the economic picture may lessen some of the pressure of illegal removal of Forest commodities.

4. Environmental Consequences

OVERVIEW

Environmental consequences are the effects, impacts and changes of implementing an alternative on the physical, biological, social, and economic environment. This chapter displays output levels by alternative and describes the direct and indirect environmental consequences that result from alternatives considered in detail. Direct environmental effects are defined as those occurring at the same time and place as the initial cause or action. Indirect effects are those that occur later in time or are spatially removed from the activity but are significant in the foreseeable future.

Analysis and evaluation of the consequences provide the analytic basis for comparison of alternatives. Alternatives considered in detail in developing the Coronado National Forest Land and Resource Management Plan are described in Chapter 2.

Environmental consequences of the alternatives result from application of various combinations of management prescriptions. In each alternative, the mix of prescriptions produces different levels of resource outputs, including recreation, wildlife habitat, timber and firewood production, water yield, watershed condition and grazing capacity. The interaction between the level of outputs and location of their production and timing yields distinct environmental consequences.

Environmental consequences for all alternatives fall within certain limits because of Forest-wide management requirements to ensure long-term productivity of the land. These requirements, are contained in standards and guidelines and apply to all management prescriptions. The alternatives considered in detail, do not significantly reduce long-term productivity.

Irreversible and irretrievable resource commitments are noted where appropriate. Irreversible commitments are decisions affecting the nonrenewable resources--soil, mineral and cultural resources. Such commitments of resources are considered irreversible because the resource has deteriorated to the point that renewal can occur only over a long period of time or at a great expense, or the resource has been destroyed or removed. The irretrievable commitments represent opportunities foregone for the period during which resource use or production cannot be realized. These decisions are reversible, but the production opportunities foregone are irretrievable. Irretrievable losses are calculated by subtracting selected outputs of the Proposed Action Alternative from the alternative with the highest output in Period 5. These are shown in Table 78.

Probable adverse environmental effects which cannot be avoided are discussed. Unavoidable adverse effects result from managing the land for one resource at the expense of the use or condition of other resources. Management prescriptions mitigate most adverse effects by limiting the extent or duration of effects. Alternative formulation eliminated alternatives which would have resulted in excessive impacts. Mitigation/coordination measures within standards and guidelines further reduce these conflicts.

Short-term uses are those that occur annually within the first ten year period while long-term productivity refers to the capability of the Forest to continue producing goods and services 50 years and beyond. Short-term uses are timber and fuelwood harvest, all recreation uses, livestock grazing, mineral extraction, and special land uses.

Soil and water are the primary resources upon which productivity is based. Short-term uses that damage soils and soil-water relationships impair long-term productivity. Management requirements provide for protection of long-term productivity by requiring that impacts on soils and water from short-term uses be mitigated and/or that short-term uses enhance soil productivity and water yield and quality.

Net public benefits are derived from resources with market and assignable prices as well as resources and conditions for which prices cannot be determined (see Chapter 2 for more detailed discussion of NPB). Examples of priced components that contribute to the NPB are timber production, acre/ft of water yield, forage produced, and cords of firewood harvested. Examples of nonpriced components that contribute to the NPB are acres of visual quality, amount of soil lost, acres of

threatened or endangered wildlife habitat enhanced or maintained, or the quality of a wilderness experience.

Nonpriced benefits include quantitative and qualitative outputs and effects. Quantitative and qualitative outputs and effects are crucial in understanding the whole picture of environmental consequences and NPBs. For example, watersheds are described both in terms of how much water they yield, and in terms of satisfactory or unsatisfactory condition. Quantitative and qualitative outputs are discussed in this chapter and in Chapter 2. The relationship between resource outputs and environmental qualities and the consequences is explained, and where relevant, the ties between the quantitative and qualitative aspects are included.

Predicted outputs for the planning period were developed using FORPLAN. Additional detail on predictions of multi-resource interactions for each alternative is included in planning records on file at the Forest Supervisor's Office.

Section A of Chapter 4 discusses resource considerations while Section B covers economic and social considerations.

Section C covers miscellaneous considerations and Section D summarizes the environmental consequences.

SECTION A RESOURCE CONSIDERATIONS

RECREATION

Developed and Dispersed

The Recreation Opportunity Spectrum (ROS) was utilized to evaluate the long term environmental consequences that each alternative would have on the recreation opportunities. (See Chapter 3 and Glossary.) Two factors in these alternatives that most clearly influence changes in ROS class designation are: 1) the number of additional acres of wilderness, and 2) the number of acres of new site construction for developed recreation.

Table 40 displays how the acres by Recreation Opportunity Spectrum (ROS) class would change under each alternative. This table is useful in comparing the general kinds of recreation opportunities that would be available under each alternative.

Table 40. Changes in Recreation Opportunity Spectrum Classes

ROS Class	Acres by Alternative					
	PA	A	B	C	D	E
Primitive	152,520	138,990	138,990	168,510	176,300	168,920
Semi-Primitive Nonmotorized	371,062	384,592	384,592	355,072	347,282	354,662
Semi-Primitive Motorized	1,002,497	1,002,672	999,922	999,922	1,001,641	1,001,641
Roaded Natural Appearing	195,826	195,651	198,401	198,401	196,682	196,682
Rural	3,653	3,653	3,653	3,653	3,653	3,653
Urban	956	956	956	956	956	956
	1,726,514	1,726,514	1,726,514	1,726,514	1,726,514	1,726,514

Alternative A, which continues current management direction, retains the current amount of acres in wilderness management and plans no new developed recreation sites. Therefore ROS class designation remains constant.

The Proposed Action represents a minimal amount of ROS change. This alternative proposes both a small number of additional wilderness acres and the least amount of recreation development (i.e. after Alternative A, which proposes no additional wilderness or developed sites.)

Alternatives D & E have a moderate amount of recreation development. Alternative D, however, has the maximum amount of proposed wilderness acres. Alternative E

also has a large amount of wilderness acres proposed. With a moderate amount of recreation development and the maximum amount of wilderness, the total ROS distribution would shift toward the Primitive end of the Spectrum for both of these alternatives.

Alternatives B and C both provide the maximum amount of acres for recreation development. The ROS class distribution would shift toward the Urban end of the Spectrum. Alternative B, with no acres proposed for wilderness would have the maximum amount of development.

Development Opportunities

Under Alternative A there would be no new recreation site development. The practical site potential for existing sites will be reached sometime around the year 2000. After that date, new demands for developed recreation opportunities could not be accommodated without site deterioration and a lowering of the quality of the recreation experience.

The Proposed Action provides for some new recreation site development to meet demand in key areas. Emphasis on rehabilitation of existing sites will reduce site deterioration and improve the quality of the recreation experience.

Alternatives D and E provide for a moderate amount of new site development to relieve demand on existing sites while maintaining quality experience levels.

Alternatives B and C provide the maximum amount of new development and would respond best to meeting demands for new opportunities and for maintaining a high quality experience level in developed sites.

Under the Proposed Action and all alternatives, the number of recreation residence sites would be reduced by the year 1990 in the Santa Catalina mountains and Madera Canyon and no new sites would be permitted in order to respond to increased public recreation demands.

Dispersed Recreation

Table 41 displays dispersed recreation (RVDs) by alternative. For comparative purposes, the minimum and maximum potential use by decade is also shown.

Table 41. Dispersed Recreation Opportunity (includes other dispersed, other wilderness, hunting, fishing, and nongame use.)

Alternatives	Average Annual Use (MRVD) By Decades				
	1	2	3	4	5
Minimum 1/	1333	1580	1914	2331	2823
PA	1488	1802	2182	2649	3202
A (Current)	1423	1725	2083	2527	3053
B (RPA)	1472	1761	2130	2584	3131
C	1511	1832	2223	2695	3262
D	1517	1843	2236	2710	3282
E	1502	1820	2205	2674	3237
Actual 1980 RPA Goal	933	990	1035	1080	1125
Maximum 2/	1531	1858	2255	2733	3308

1/ From Low Intensity Benchmark
2/ From Maximize Wilderness Acres Benchmark

All alternatives provide for dispersed and wildlife use to remain within capacity. The Proposed Action (PA) provides for a total average annual dispersed and wildlife use of 3202 MRVDs in Period 5. This level meets 60% of the demand projected for that period. For the first decade, alternative D would provide for the highest level of dispersed use, while alternative A would provide the least amount of dispersed use.

Recreation Residences

Recreation residences, with the exception of those on tenure in the Santa Catalina Mountains and Madera Canyon, will be maintained unless and until a determination has been made that the lot involved is needed for a higher priority public use.

Off-Road Vehicle Management

There is considerable difference in proposed management of motorized vehicles between some alternatives because of variations in management emphasis. Table 42 displays the percent of the Forest either open to off road use, closed to all use or where use is restricted to roads and trails.

The alternatives differ in the amount of area closed to all vehicle use primarily because of the number of wilderness areas and research natural areas. The use is restricted by existing regulations applicable to these areas.

The Proposed Action and Alternatives C and D would continue the use of motor vehicles on roads and trails. Use of motor vehicles off of roads or trails would not be allowed except by permit. This will result in less damage to soil, water, and vegetative resources and less disturbance of wildlife. Alternatives A and E would allow motor vehicle travel off roads in some areas of the Forest where permanent resource damage is less likely. Potential damage would be greater than in the PA or Alternatives C and D. Alternative B would allow motor vehicle travel off roads on most of the Forest. Potential resource damage would be greatest in this Alternative.

In those areas where motor vehicle use is restricted to roads and trails, the roads or trails open to vehicle use would be designated with route markers. This signing is already planned as part of Southwestern Regional policy to sign the entire transportation system on each National Forest. The cost of signing between alternatives is negligible.

The cost of enforcement of the motor vehicle policy will vary some between alternatives. Those where little or no use off roads or trails is allowed will take more enforcement action than those that allow use off of roads or trails. The enforcement cost would be off-set by reduced costs to mitigate resource damage.

Table 42. Off Road Vehicle Management (Percent of Forest)

Management Designation	Alternatives					
	PA	A	B	C	D	E
Open	0%	56%	72%	0%	0%	34%
Closed	24	25	20	25	34	24
Restricted 1/	76	19	8	75	66	42

1/ Restrictions may vary by area, season and type of use.

Caves

There is no variation in cave management between alternatives. Management of caves will continue to follow current direction under all alternatives. Use will be by permit and vandalism will be checked when possible. However, vandalism is expected to continue with possible increases as recreation use increases.

Trails

Backpacking, hiking, hunting, fishing, horseback riding, and other dispersed recreation uses are dependent on an adequate trail system to disperse users and provide access. Without such a system, adverse effects such as soil compaction, wildlife harassment and changes in visual quality can be expected. There are no differences between alternatives in terms of trail construction and reconstruction.

WILDERNESS

The New Mexico Wilderness Act of 1980 and the Arizona Wilderness Act of 1984 resolved the issue of additional wilderness except for three additional Wilderness Study Areas (WSAs). The Miller Peak, Mt. Wrightson, Pajarita, Rincon Mountain and Santa Teresa areas were designated as wilderness and additions were made to the existing Chiricahua and Galiuro Wilderness areas. The Pusch Ridge Wilderness is unchanged by the Arizona Act. The Bunk Robinson, Whitmire Canyon and Mount Graham roadless areas were designated as Wilderness Study Areas.

Roadless and undeveloped areas in the nonwilderness category are now available for other multiple uses, except for those classified as WSAs. The Acts also restrict the Forest from any further consideration of wilderness designation except for the WSAs until revision of the Forest Plan.

The Bureau of Land Management administered WSAs were analyzed together with contiguous Forest Service WSAs and recommendations were developed for each joint roadless area. One exception to this is the Bowie Mountain WSA. Because it is no longer contiguous to any Forest Service roadless area being considered for wilderness, BLM developed its recommendation independently. The wilderness evaluation of BLM lands is being done under an interagency agreement of April 1980, as amended. For the purpose of this analysis, BLM lands are being evaluated only for wilderness suitability. Allocations of other resource uses analyzed and proposed by this planning effort apply only to Forest Lands, not public lands administered by BLM. Future management consideration of BLM WSAs not recommended for wilderness will be determined through BLM planning processes.

Wilderness Study Areas

The following is a discussion of the resource tradeoffs between alternatives for each FS and BLM WSA due to a wilderness, non-wilderness or partial wilderness recommendation. Further detail is available in Technical Reports available at the Coronado N.F. Office in Tucson, Arizona and BLM Offices in Safford, Arizona and Las Cruces, New Mexico.

Recommendations in the Proposed Action are preliminary administrative recommendations that will receive further review and possible modification by the Chief of the Forest Service, the Director of the Bureau of Land Management, the Secretaries of Agriculture and Interior, and the President of the United States. Final decisions on wilderness and nonwilderness designations have been reserved by the Congress to itself. Until Congress makes a decision regarding management direction, all WSAs will be managed to maintain the existing wilderness character and potential for inclusion in the National Wilderness Preservation System.

Bunk Robinson
Baker Canyon
Guadalupe Canyon

The differences in annual resource opportunities by period five between alternatives are small regardless of a wilderness or nonwilderness recommendation as shown in Tables 43, 44, and 45.

Table 43. Bunk Robinson WSA Estimated Outputs for Period 5

	Alternatives					
Outputs	PA	A	B	C	D	E
Wilderness Acres	0	0	0	11034	15960	11034
Non-wilderness Acres	15960	15960	15960	4926	0	4926
Grazing Use (AUM)	3489	3402	3531	3391	3380	3430
Fuelwood harvest (Cords)	41	0	52	8	0	23
Recreation use (RVD)	8705	9021	8705	14326	15408	13880
Wildlife use (RVD)	3581	2407	2735	2985	2671	2935

Table 44. Baker Canyon WSA Estimated Outputs for Period 5

	Alternatives					
Outputs	PA	A	B	C	D	E
Wilderness Acres	0	0	0	2553	4812	2553
Non-wilderness Acres	4812	4812	4812	2259	0	2259
Grazing Use (AUM)	1085	1085	1085	1085	1085	1085
Fuelwood harvest (Cords)	0	0	0	0	0	0
Recreation use (RVD)	2625	2720	2625	4320	4645	4185
Wildlife Use (RVD)	1080	726	825	900	805	885

Table 45. Guadalupe Canyon WSA Estimated Outputs for Period 5

Outputs	Alternatives					
	PA	A	B	C	D	E
Wilderness Acres	0	0	0	4145	2812	4145
Non-wilderness Acres	4145	4145	4145	0	0	0
Grazing Use (AUM)	849	849	849	849	849	849
Fuelwood harvest (Cords)	0	0	0	0	0	0
Recreation use (RVD)	1993	2067	1993	3285	3543	3124
Wildlife Use (RVD)	812	554	627	664	591	658

Locatable and leasable mineral potential for these WSAs is mostly uncertain. Past mineral activity has been limited except for one active claim near the northwest corner of the Bunk Robinson WSA. Future mineral development could be foregone if the WSAs or portions thereof are designated as wilderness. The mineral estate of the 454 acres in Section 2 of T. 34 S., R. 22 W., NMPM is owned by the State of New Mexico. A potential of surface impairment exists if the minerals are ever leased and developed. However, all mineral surveys in this area indicate an almost non-existent potential for deposits of commercial value. Habitat for some wildlife species could be enhanced by a wilderness designation, especially those requiring isolation. Habitat for other species such as Gould's turkey, desert bighorn sheep and deer could be adversely affected over time by a wilderness designation because of restrictions on direct habitat improvement such as prescribed burning. Support for wilderness designation for all three WSAs has come from interests outside the local area (more than 100 miles). Many local residents and interests have opposed a wilderness designation. The vegetative communities identified for these WSAs are found in other nearby existing wilderness areas.

The Proposed Action would propose no wilderness recommendation thus leaving most future management options open. Special wildlife habitats in Guadalupe Canyon would be protected through recommendation of a zoological area, with mineral withdrawal. This designation would fit with established management direction, Outstanding Natural Area, for the BLM portion of Guadalupe Canyon. Opportunities to improve upon habitat for wildlife species such as desert bighorn sheep and Gould's turkey would be available. The ecosystems found in these areas are represented in existing wilderness areas. Opportunities for primitive recreation and solitude would not be diminished by the proposed management of these areas. These opportunities also exist elsewhere.

Alternative A would continue the WSAs as study areas. The overall effects would be similar to a wilderness designation except mineral exploration and development could take place under certain restrictions. Uncertainty over future management opportunities would continue.

Under Alternative B, an attempt would be made to increase livestock grazing capacity. The vegetative manipulation practices used to generate this slight increase would be incompatible with wilderness management.

In Alternatives C and E the south portion of the Bunk Robinson WSA and the east portion of the Baker Canyon WSA would be recommended for wilderness along with the entire Guadalupe Canyon WSA. These boundary adjustments would eliminate most known conflicts with mineral development, intensive wildlife habitat improvement and wood harvest opportunities. They would also improve on-the-ground wilderness management by establishing easily identified topographic boundaries. The northern portion of the Bunk Robinson WSA would be managed with emphasis on livestock grazing and game habitat management.

Under Alternative D the maximum suitable acres would be recommended for wilderness for all three WSAs. Boundary adjustments are recommended for Guadalupe Canyon due to the existence of a maintained road. This alternative would provide the most new wilderness opportunities. Future opportunities for wildlife habitat management and mineral development would be foregone.

Bowie Mountain

The Bowie Mountain WSA is no longer contiguous to any Forest Service administered WSAs. Since it is greater than 5000 acres in size, it is being considered for wilderness or non-wilderness management based on its own merits. As shown in Table 46, any resource management opportunities foregone due to a wilderness or non-wilderness designation are generally insignificant. These are average annual outputs by the fifth period.

Table 46. Bowie Mountain WSA Estimated Outputs for Period 5

	Alternatives					
Outputs	PA	A	B	C	D	E
Wilderness Acres	0	0	0	6156	6156	0
Non-wilderness Acres	6156	6156	6156	0	0	6156
Grazing Use (AUM)	1454	1454	1454	1454	1454	1454
Fuelwood harvest (Cords)	0	0	0	0	0	0
Recreation use (RVD)	2958	2640	2958	5018	4958	2958
Wildlife use (RVD)	1388	845	1246	1003	957	1397

A wilderness designation could preclude future mineral exploration and development opportunities. However due to the nature of current and past mineral activities, any opportunities foregone are felt to be minimal. A wilderness designation would enhance and protect special historic and prehistoric values of the WSA. Also wildlife habitat for some species such as raptors would be enhanced. Part of the WSA is in a vegetative community that is lightly represented in the Wilderness Preservation System. This is the Mexican-Highland/Grama-Tobosa Shrub Steppe. There is concern that the WSA can not be effectively managed to preserve its wilderness character in the long run. Because of the two private inholdings and small size of the WSA, BLM cannot ensure the wilderness values would not be impacted by activities on private lands within and adjacent to the WSA.

The Proposed Action and Alternatives B and E would retain the WSA in a nonwilderness status because of the concern about maintaining the wilderness character over the long run.

Alternative A would keep the area under interim management in perpetuity. This would not meet legal requirements or satisfy social needs to make a decision on future management of the area.

Alternatives C and D would recommend a wilderness designation for the reasons stated above.

BLM Galiuro

The difference in annual resource opportunities between wilderness or non-wilderness alternatives by period five is insignificant due to the size and ruggedness of the WSA. Any potential mineral opportunities foregone are also insignificant.

Table 47. BLM Galiuro WSA Estimated Outputs for Period 5

	Alternatives					
Outputs	PA	A	B	C	D	E
Wilderness Acres	640	0	0	640	640	640
Non-wilderness Acres	0	640	640	0	0	0
Grazing Use (AUM)	96	96	96	96	96	96
Fuelwood harvest (Cords)	0	0	0	0	0	0
Recreation use (RVD)	308	274	308	522	516	308
Wildlife use (RVD)	144	88	130	104	100	145

Under the Proposed Action and Alternatives C, D and E, the entire WSA would be recommended for wilderness designation. This area is natural in character and essentially identical to the contiguous Galiuro Wilderness Area. It is a logical addition to the existing wilderness.

In Alternative A the area would remain under interim management in perpetuity.

In Alternative B, the WSA would remain in a nonwilderness status to retain any opportunities for increasing livestock forage.

Whitmire Canyon

By period five, the difference in annual resource opportunities between alternatives is small as shown in Table 48.

Table 48. Whitmire Canyon WSA Estimated Outputs for Period 5

	Alternatives					
Outputs	PA	A	B	C	D	E
Wilderness Acres	0	0	0	11494	12840	0
Non-wilderness Acres	12840	12840	12840	1346	0	12840
Grazing Use (AUM)	2751	2678	2766	2678	2671	2736
Fuelwood harvest (Cords)	32	0	36	4	0	32
Recreation use (RVD)	6169	6169	6169	9891	10238	6169
Wildlife use (RVD)	2896	1763	2598	2092	1996	2914

There is opportunity to directly increase wildlife habitat for some species such as deer, desert bighorn sheep and Gould's turkey. Habitat improvement practices such as prescribed burning would be incompatible with wilderness management. A wilderness designation would probably enhance the habitat for some species requiring isolation such as mountain lions. Locatable and leasable mineral potential is mostly uncertain. Past mineral activity is almost nonexistent. Future opportunities for mineral development could be foregone with wilderness designation however, those opportunities are considered minimal.

Support for wilderness designation has come mostly from persons or interests outside a 100 mile radius, while many local residents and interests oppose a wilderness designation. The vegetative community identified for the WSA is represented in other nearby existing wilderness areas.

The Proposed Action and Alternatives B and E would not recommend wilderness designation for the WSA, thereby leaving most future management options open. These opportunities include direct habitat improvement (prescribed burning) for deer, Gould's turkey and desert bighorn sheep. Future fuelwood harvest opportunities would be available, however, roads would have to be constructed to access the additional volumes. This would not be cost effective for this activity alone. The ecosystems found in this area are represented in existing wilderness areas. Opportunities for primitive recreation and solitude would not be diminished by the proposed management of the area. These opportunities also exist in nearby wilderness areas.

Alternative A would continue interim management into the future. The effect would be similar to a wilderness designation, except mineral exploration and development could continue. This alternative would not satisfy legal requirements or social needs to make a decision on future management direction.

Under Alternative C, a wilderness designation would be recommended with a slightly modified boundary. This modification would eliminate any expected management conflicts with fuelwood harvest, vegetation manipulation, or motorized camping in currently roaded areas. The wilderness designation could forgo future wildlife management opportunities.

Under Alternative D, the entire WSA would be recommended for wilderness. Any foregone opportunities are considered minimal with the exception of wildlife habitat improvement.

Mt. Graham

Within the Mt. Graham WSA, the future annual resource opportunities differ some between wilderness and non-wilderness alternatives by period five.

Table 49. Mt. Graham WSA Estimated Outputs for Period 5

Outputs	Alternatives					
	PA	A	B	C	D	E
Wilderness Acres	62000	0	0	62000	62000	62000
Non-wilderness Acres	0	62000	62000	0	0	0
Grazing Use (AUM)	14148	12502	16186	14244	14244	14244
Fuelwood harvest (Cords)	0	0	154	0	0	0
Recreation use (RVD)	136068	106666	121079	136897	135424	135425
Wildlife use (RVD)	12060	11612	13420	12070	12062	12073

Based on past activity and geologic information, mineral potential for locatable and leasable minerals is rated as low. Any future mineral activities foregone due to full or partial wilderness designation would be insignificant. The maximum loss in grazing use is less than 15% (2000 AUMs per year). Any increase in fuelwood harvest would require additional road construction which would not be cost effective when considering that activity alone.

There has been strong support in Arizona for a Mt. Graham wilderness area, however some local Forest users oppose such a designation. The WSA contains two vegetative communities (Arizona Pine Forest and Oak-Juniper Woodland) that span a wide range of elevations. Both are represented to some extent in other existing wilderness areas.

The Proposed Action and Alternatives C, D, and E would recommend all of the Mt. Graham WSA for wilderness.

Alternative A would continue the WSA under interim management. This would not meet legal requirements and social needs to make a final management decision for the Mt. Graham WSA.

Under Alternative B, no wilderness recommendation is made so that future opportunities to increase forage for livestock are available. The management practices used in many areas would not be compatible with wilderness management.

Wilderness Management

Wilderness use depends to a large extent on an adequate trail system to disperse users and provide access. New trails will be constructed in the Pusch Ridge Wilderness under all alternatives except A. The trails, along with Catalina State Park which is on the northwest side of the Wilderness, will help to obtain a more even distribution of recreationists in the wilderness.

Table 50 displays annual trail construction or reconstruction by alternative by period. All alternatives except A have the same outputs with all efforts toward reconstruction during the first period and concentration on construction for the remaining periods. These efforts, in conjunction with a continuing volunteer program, will slow the deterioration rate of the system but will not improve the system as a whole as use increases.

Table 50. Wilderness Trail Construction and Reconstruction

Trail Facilities	Average Annual Miles By Alternative					
	PA	A	B	C	D	E
Period 1						
Construction	0	0	0	0	0	0
Reconstruction	1.5	0	1.5	1.5	1.5	1.5
Period 2						
Construction	2.5	0	2.5	2.5	2.5	2.5
Reconstruction	0	0	0	0	0	0

Table 50. Wilderness Trail Construction and Reconstruction (Continued)

	Average Annual Miles By Alternative					
Trail Facilities	PA	A	B	C	D	E
Period 3						
Construction	2.5	0	2.5	2.5	2.5	2.5
Reconstruction	0	0	0	0	0	0
Period 4						
Construction	2.7	0	2.7	2.7	2.7	2.7
Reconstruction	0	0	0	0	0	0
Period 5						
Construction	5.5	0	5.5	5.5	5.5	5.5
Reconstruction	0	0	0	0	0	0

Table 51 displays range management intensity in wilderness by level and alternative. Under the Proposed Action, 88,600 acres will be unstocked, 175,300 acres will be open to grazing with some allotments needing additional management and 108,100 acres are stocked with management systems already being applied on the ground which should lead to resource improvements.

Alternatives A and B will continue at about the same acreage without stocking, however slightly less acres will be at lower management intensity levels. Alternatives C, D, and E provide for almost twice as many acres to remain unstocked due to the increased acres allocated to wilderness that are currently unstocked. Alternative D falls between C and E except for increased acreage falling in management intensity levels B and C.

Table 51. Range Management Intensity Levels in Wilderness Areas

	Thousand Acres by Alternative					
Management Level	PA	A	B	C	D	E
A	93.5	78.8	77.5	63.3	74.1	78.1
B	243.0	156.2	130.0	216.2	213.6	200.5
C	64.7	104.2	131.7	144.2	142.3	133.6
Totals	401.2	339.2	339.2	423.7	430.0	412.2

The fire management policy in wilderness areas is essentially the same in all alternatives. Lightning fires will be used as prescribed fires to meet wilderness objectives, so long as life, resources, and adjacent property are protected. This will allow for a more natural ecological succession of the plant and animal communities, but may have temporary adverse effects on air, visual, and water quality as well as recreation. Planned ignitions are also included in the Proposed Action and Alternatives B, C, D and E. These are needed to supplement the use of lightning fires in meeting wilderness objectives.

Adverse environmental effects which cannot be avoided include interference with natural processes and reduction of wilderness values where less than standard service is provided, where range improvements conflict with the setting or locatable minerals are developed.

VISUAL RESOURCE

The Forest has been inventoried for Visual Quality Objectives (VQOs). VQOs of preservation, retention, partial retention, modification and maximum modification are assigned to each acre based on the inventory criteria. The criteria includes visibility, number of viewers, and the uniqueness or variety of a landscape.

Visual Quality Objectives will be met for all management activities under all alternatives except for some small and localized exceptions. However, the Visual Condition, or degree of alteration of the natural landscape, will vary for each alternative but changes will be harmonious and VQOs will be met. Changes will not constitute unacceptable deviations to the natural landscape, but in some instances will result in a more "managed" appearing, rather than "natural" appearing landscape. Activities that affect this change include, but are not limited to: range improvements and practices; timber and fuelwood harvesting and related activities; wildlife and fish habitat improvement; soil and watershed maintenance and improvement projects; recreation development; and mineral activity. Areas designated as Wilderness retain a more natural or wild character than National Forest lands at large. There is little alteration of the landscape or evidence of management activities. Ecological relationships generally take precedence over man's resource objectives. Therefore, the Forest will have a more "natural" character in alternatives C and D which emphasize additional wilderness designation. A more "managed" character will occur in alternative B with a minimum amount of recommended wilderness.

Irretrievable effects are the result of changes such as roading where cuts and fills pose unusual problems in revegetation and visual quality objectives cannot be met. Changes such as this are small and highly localized.
Mining, utilities, oil and gas operations are not predictable for exact location or the degree of impact. Some irretrievable effects could possibly occur as a result of these activities where denial of the action is not possible.

CULTURAL RESOURCES

Cultural resources are a unique nonrenewable feature of the environment. Efforts will be made under each alternative to inventory, evaluate, preserve and protect significant prehistoric and historic sites. All activities involving land disturbance require cultural resource inventories. Each alternative has the requisite budget to accomplish this work. Consultation with the State Historic Preservation Office and the Advisory Council of Historic Preservation is provided in all alternatives to determine protection and/or mitigation requirements where sites can not be avoided. Each alternative includes compliance with the negotiated settlement of the "Save the Jemez et al./State of New Mexico versus Forest Service" litigation.

The protection of known cultural resources from natural deterioration or vandalism occurs at a moderate level in all alternatives. Protection and interpretation of the Rucker Historic Site is provided for under all alternatives except A. Interpretation of cultural resources for public information and education occurs in each alternative except A. Interpretation is provided for mainly in conjunction with specific projects in each alternative.

Those alternatives that allow for a higher degree of ground disturbing activity have a relatively higher potential for adversely affecting cultural resources than alternatives that minimize such activities. However, the potential of adverse effects from even a high disturbance alternative may be reduced or eliminated by appropriate planning to avoid areas of cultural resources sensitivity.

Because ground disturbing projects in any alternative generally involve small acreages, the potential impacts to cultural resources do not vary greatly by alternative as shown in Table 51A. Avoidance and protection of sites is usually possible. Timber sales are small and occur in areas where cultural resources density is very low. Fuelwood areas generally contain cultural resources, however, the nature of these projects enables avoidance and protection of sites. Maximizing livestock grazing has a higher potential to affect cultural resources because of the relatively large number of projects forest-wide. Potential impacts cultural resources also occur because of unplanned out-service projects which can not be predicted for a given alternative. Protection and proper management of cultural resources will be ensured through appropriate consultation with the SHPO and Advisory Council.

Where resources management conflicts occur, the desirability of in-place preservation of cultural resources will be weighed against the values of the proposed land use. The preferred treatment of cultural resources is preservation in place. Interactions among cultural and other resources will be considered in detail in the cultural resources management planning assessment to be prepared under each alternative.

Table 51A. Potential Impacts of Resource Uses and Activities on Cultural Resources

Alternative	Timber Harvest	Livestock Grazing	Mineral Development	Roads
PA	Low	Moderate	Moderate	Low
A	Low	Moderate	Moderate	Low
B	Moderate	High	Moderate	Moderate
C	Low	Moderate	Moderate	Low
D	Low	Moderate	Moderate	Low
E	Low	Moderate	Moderate	Low

WILDLIFE AND FISH

Wildlife Habitat

Wildlife habitats are influenced primarily by 2 factors: 1) direct habitat improvement and maintenance, and 2) habitat changes resulting from other activities. Table 52 displays potential impacts on occupied habitat of management indicator species by implementation of each alternative.

Table 52. Forest-Wide Impact of Alternative Implementation on Occupied Habitat for Management Indicator Species in Period 5 (Base year for comparison is 1980)

MANAGEMENT INDICATOR SPECIES GROUP	Alternatives PA	A	B	C	D	E
Cavity Nester	No Change to 5% decrease	No change	5 to 10% decrease	No Change	No Change	No change to 5% decrease
Riparian Species	5% increase	No change	No Change	No Change	5% increase	No change
Species Needing Diversity	No change to 5% increase	No change	No change to 5% decrease	No change	No change to 5 to 10% decrease	No change to 5% increase
Species Needing Good Herbaceous Cover	5 - 10% increase	No change to 5% increase	5 to 10% increase	No change to 5% increase	No Change	5 to 10% increase
Dense Canopied Species	No change	No change	5 - 10% decrease	No change	No change	No change
Game Species	No change to 5% increase	No change to 5% increase	5 to 10% decrease	5% increase	5% increase	5% increase
Special Interest	No change	No change	No change	No change	No change to 5% increase	No change to 5% increase
Threatened and Endangered Species	No change to 5% increase	No change	No change	5 to 10% increase	5 to 10% increase	5 to 10% increase

Habitat improvement is also accomplished through project work of other activities. Important to various wildlife species are development of waters and improved grazing, creations of openings and increased shrub layering and use of prescribed fire.

Finally habitat can be mitigated, maintained or improved through wildlife coordination with other resource activities. The level of coordination intensity is shown in Table 53.

Table 53. Comparison of Wildlife Coordination Intensity

	Alternative					
	PA	A	B	C	D	E
Percent change in coordination from Alt. A (average over 5 decades)	+2	0	+20	-3	-6	+7

The Proposed Action and Alternatives B and E show higher amounts of coordination because of increased habitat mitigation and maintenance needs due to higher levels of other resource activity. Alternatives C and D will generally have lower levels of other resource activity and therefore less need for coordination.

Wildlife planning objectives for Arizona are described in Arizona Wildlife and Fisheries Comprehensive Plan by the U.S.D.A. Forest Service and Arizona Game & Fish Dept., 1981, 27 pp. New Mexico's objectives are given in Comprehensive Plan Part 1: Strategic Section, 1978, 76 pp. and Operation Plan. Part II. Management of New Mexico Wildlife 1981-1985, 133 pp. both published by the New Mexico Dept. of Game & Fish.

Alternative C most nearly meets the planning objectives of both states, but fails to completely fulfill these single resource expectations, because of the need for coordination with other resources. The Proposed Action, and Alternatives D and E provide a moderate accomplishment somewhat less than C. Maximization of other resource objectives would provide a low level of wildlife accomplishment under alternative B.

The alternatives differ in the degree to which the forest is responsible for recovery efforts for Threatened and Endangered Species (T&E).

Alternatives C, D and E provide a moderately high level of T&E effort. These alternatives provide for needed studies on habitat requirements for T&E and unique species, and a moderate amount of habitat manipulation. Under these alternatives the Arizona listed Desert Bighorn Sheep, several T&E fishes, and the Mexican Turkey would continue to receive emphasis.

The Proposed Action and Alternative A provide somewhat reduced efforts, largely because of budget constraints. Joint efforts to enhance Bighorn habitat would continue in conjunction with the Arizona Game and Fish Department and the University of Arizona. Studies of endangered plants would continue at approximately the present rate.

Alternative B would meet the minimum requirements of the Endangered Species Act.

In all alternatives the threatened and endangered species effort includes participation in reaching recovery plan objectives, habitat coordination and surveys for listed species, and habitat improvement. Any reintroduction of native wildlife species to historical habitat will be done in conjunction with state and federal wildlife agencies.

Fuelwood and grazing, under the Proposed Action would result in habitat manipulation. Most habitat changes will be beneficial to most wildlife species. Needed wildlife habitat improvements not accomplished by wood harvest and grazing improvement activities will be undertaken by direct investment in wildlife projects. Livestock-wildlife conflicts will be eliminated by the fifth period by increased emphasis on proper stocking and improved range management. Additionally, special emphasis on riparian management will result in significant improvement in this highly valuable habitat.

Nongame animals are emphasized along with special interest and T&E species in Alternative D. Animals more commonly associated with wilderness or other "natural" habitats are favored.

In Alternative A, the current situation, timber harvests are closely coordinated with wildlife values. Fuelwood harvests are designed to maintain or improve wildlife habitats. Slow, but steady, progress in grazing management will decrease wildlife-livestock conflicts. Emphasis is placed on nongame, peripheral, rare, endangered, and special interest species habitat maintenance.

Alternatives C and E emphasize management of game species with other wildlife in an effort to meet the goals of the Arizona and New Mexico wildlife comprehensive plans.

Alternative B emphasizes production of saleable commodities and therefore nongame wildlife are negatively impacted. Under this management, forage is allocated primarily to livestock, resulting in availability to some species at lower than current levels. Extensive conversion of woody areas to grasslands also impacts wildlife habitat. Only minimum legal requirements for wildlife management would be met.

All alternatives except A allow natural fires to burn more frequently on the Coronado under prescribed conditions. This increased use of fire will benefit species dependent on seral stages, especially in the wilderness areas.

All alternatives call for continued maintenance of Pena Blanca, Parker Canyon, Rose Canyon, Rucker Canyon, and Riggs Flat Lakes in cooperation with the Arizona Department of Game and Fish. No new lakes are projected for development, however, the Arizona Game and Fish Department plans major renovation of Pena Blanca Lake. Current lakes need continuing effort to clear out rocks and silt and keep up with weed removal. Mechanical means will generally be used for maintenance, supplemented with herbicides as needed. Native fish may be reintroduced into suitable lakes and streams. The Proposed Action calls for maintenance of Herb Martyr and John Hands Lakes for trout. Snow Flat Lake will continue to be maintained by the Forest Service, while the City of Safford plans to maintain Frye Reservoir.

Predator control is exercised by state game and fish departments to protect wildlife and by the U.S. Fish and Wildlife Service for livestock protection. In all alternatives, the Coronado will cooperate with these agencies following existing executive orders and regulations.

Increased human activities in project areas may temporarily displace wildlife. Roads may have a longer impact on wildlife due to human activities associated with new access into areas previously unroaded and improved access into areas that previously had low standard non-surfaced roads. Intensified livestock production could displace some species even while increasing habitat for others.

RANGE

Of the one and one half million acres of suitable and available range on the Coronado, approximately 84% is currently in a satisfactory condition. Much of the remaining 16% will remain unsatisfactory until some change in management and/or stocking rate occurs.

Within the limiting factors of soil and climate, the ability of a range to produce livestock forage is proportional to the level of management practiced and to the emphasis on livestock grazing compared to other uses. Partitioning of forage between wildlife and livestock is a management decision which varies by alternative. While there is only a slight difference in grazing impacts by domestic and wild animals, the partitioning of forage to livestock can conflict with wildlife use. Domestic livestock use can be regulated while wildlife use can not. The more forage assigned to livestock, the less forage is available to wildlife, yet wildlife needs will remain the same. This can lead to an over utilization of forage or redistribution of wildlife where substantial forage is assigned to livestock in high wildlife use areas.

The Wilderness Act of 1964 and the Arizona Wilderness Act of 1984 permit livestock grazing where it existed prior to wilderness designation, therefore, livestock grazing will continue in all wilderness areas on the Forest.

Range management intensity describes the level of management on the livestock allotments. Grazing in the wilderness varies from A to C. (See Glossary for a definition of levels.) Many allotments within wilderness also cross the wilderness boundaries. Increased management outside the wilderness boundaries will lessen impacts inside the boundaries.

Most forage species in Southern Arizona can sustain use levels of 35-50 percent without physiological damage, if given adequate rest following grazing. In the absence of scheduled rest periods, the same plants can sustain only 25-30 percent use on a range in fair condition. Range improvements attempt to improve range condition and ultimately capacity in three basic ways: 1) improved distribution of animals, 2) removal of competing plants, and 3) introduction of more productive species.

Under all alternatives, management's goal is to bring the stocking rate into balance with range capacity and achieve fair or better range condition. As of 1981 it is estimated that stocking exceeds capacity by 73,000 AUMs. This overstocking, in combination with a lack of adequate range management on some allotments, causes a gradual loss of range capacity. Needed adjustment in livestock numbers will be partially offset by improved management systems. Estimated capacities are based on an analysis of each area's production potential coupled with allowable use levels. Allowable use varies by range management levels. (See Glossary for definition of range management levels.)

Livestock use is seldom evenly distributed over the range. One goal of range management is to improve distribution, thus making more efficient use of available forage. Efficiency of use varies by management level, topography, class and breed of livestock. Increases in management intensity can be expected to proportionately improve livestock distribution, if other factors remain constant.

Application of the various management levels on the land varies by alternative (Table 54) with a resultant variation in total grazing capacity estimates.

Table 54. Range Management Intensity Levels By Alternatives

Management Level	Proposed Action	(M Acres) Alternatives A	B	C	D	E
A	215.9	217.9	199.7	230.9	238.8	229.8
A or D	45.1	43.1	23.3	6.0	11.8	52.3
B	397.0	231.7	133.9	221.5	336.1	203.5
C	306.7	135.5	134.2	1158.3	1106.0	650.7
D	761.8	1098.3	155.8	109.8	33.8	590.2
E	0	0	1079.6	0	0	0
Totals	1726.5	1726.5	1726.5	1726.5	1726.5	1726.5

All alternatives will bring the Forest average stocking and capacity into balance by the end of the second period. All alternatives will produce a sustained yield of livestock products for the foreseeable future, with the absolute level of outputs varying by the alternative (Table 55).

Table 55. Average Annual Grazing Use and Capacity

Period	Output	MAUM PA	A	B	C	D	E
1	use	350	350	357	353	352	353
	cap	333	334	348	335	334	336
2	use	338	341	370	344	343	344
	cap	340	344	372	346	344	347
3	use	344	351	393	352	349	354
	cap	348	354	393	356	354	358
4	use	354	363	402	366	363	371
	cap	355	363	402	366	363	371
5	use	360	370	406	376	372	377
	cap	360	370	406	376	372	377

At Period 5 the Proposed Action provides 89% of the grazing capacity projected for the Maximize Range Benchmark. Alternative B provides 100%, C and E are at the 93% levels, D produces 92%; while A yields 91%.

Table 56 shows the detailed breakdown for all structural and nonstructural range improvements by period for each alternative.

Table 56. Structural and Nonstructural Range Improvements by Period

Improvement Type	Unit of Measure	Alternative					
		PA	A	B	C	D	E
Period 1							
Structural							
Fences	Mi	55	70	75	8	8	50
Waters	Ea	120	150	150	11	8	95
Nonstructural							
Plant Modification	MAc	0	0	10	0	0	7
Grass Seeding	MAc	0	0	10	0	0	2
Period 2							
Structural							
Fences	Mi	55	70	75	8	8	50
Waters	Ea	120	150	150	10	8	95
Nonstructural							
Plant Modification	MAc	4	0	25	5	2	7
Grass Seeding	MAc	2	0	10	5	2	2
Period 3							
Structural							
Fences	Mi	55	70	75	55	8	50
Waters	Ea	120	150	150	5	5	95
Nonstructural							
Plant Modification	MAc	4	0	25	0	0	7
Grass Seeding	MAc	2	0	10	0	0	2
Period 4							
Structural							
Fences	Mi	30	40	60	9	9	25
Waters	Ea	25	30	120	0	5	10
Nonstructural							
Plant Modification	MAc	4	0	31	0	0	7
Grass Seeding	MAc	2	0	15	0	0	2
Period 5							
Structural							
Fences	Mi	30	40	56	0	9	25
Waters	Ea	20	30	120	0	0	10
Nonstructural							
Plant Modification	MAc	3	0	31	0	0	7
Grass Seeding	MAc	2	0	20	0	0	2

Under all alternatives, non-native grasses and forbs will be used for revegetation purposes, when natives do not meet resource objectives. Those alternatives with the highest intensity range management practices would make the most use of non-native species. Alternative B would use the most. In all alternatives native or naturalized species would be used in wilderness and research natural areas. The only exception to this policy would occur when there is a lack of native seed and reseeding needs to be done quickly because of a fire, flood, or other unanticipated event in Wilderness and Wilderness Study Areas.

Environmental effects of grazing vary with intensity of management and density of stocking. Partial removal of livestock can be expected to cause a decrease in size of problem areas, but not to solve problems. Proper stocking, coupled with improvements and management practices which provide improved distribution and periodic rest, will produce an uptrend. Certain limited areas cannot be expected to improve without control of invading woody plants.

TIMBER AND FOREST PRODUCTS

Timber Suitability

All forest lands were categorized using criteria for biologic capability, availability, and suitability for timber production. Table 57 indicates that a maximum of 23,073 acres were identified as tentatively suitable for timber production. No management alternative considered proposes to manage more than 14,558 acres for sawtimber production because more acres were not needed to meet the objectives of the alternatives.

The planning model (FORPLAN) was used to assign land for timber production from tentatively suitable lands. Lands assigned to timber production are classed as suitable. Tentatively suitable lands which were not assigned are classed as not appropriate. Suitable lands vary by alternative because different prescription mixes are selected by FORPLAN to meet differing goals and objectives of the alternatives.

Table 57. Suitable Timber Acres

Classification	Alternative					
	PA	A	B	C	D	E
Tentatively Suitable	19,273	23,073	23,073	19,273	15,473	15,473
Suitable Acres	13,729	14,558	14,268	0	14,294	14,294
Not Appropriate	5,544	8,515	8,805	19,273	1,179	1,179

Silviculture

Silvicultural treatments are the methods by which forests are tended, harvested, and reestablished. Silvicultural treatments affect timber yields and the age structure of the regenerated stands by producing even-aged or uneven-aged stands of trees.

The Proposed Action is based on a 240-year rotation on suitable acres. A system of group selection and/or small, patch shelterwood is utilized to feature 4 age classes including 20% of the area in wildlife openings. Wildlife openings will rotate and tie in with regeneration needs of individual stands. Maximum cover without stand stagnation (80 to 120 square feet basal area) is to be maintained as thermal cover for the 2 younger age classes (0-60 and 60-120 years). For the 2 older age classes (120-180 and 180-240 years) 75% of the stands are to be maintained at heavy stocking (120 basal area) for dense mature and old growth. Twenty-five percent of the older stands are to be opened up as much as possible (40 basal area) to establish park-like mature and old growth stands. Patch cuts up to 40 acres in size are used to regenerate aspen. This combination of age classes and harvest systems will maximize wildlife and aesthetic values in the coniferous forest stands. Insect and disease problems are not expected to increase.

Under Alternatives A and D, timber stands continue under an unregulated uneven-aged system. Harvest techniques are single tree selection or group selection with a maximum opening size of two acres, except openings up to 40 acres are used to regenerate aspen. Stocking would generally be 120 to 200 square feet of basal area resulting in a situation of dense crowded overstory and suppressed understory of low vigor that is vulnerable to insect and disease outbreaks.

Under Alternative B, timber harvests are used primarily to increase livestock forage by reducing the stocking to 40 square feet of basal area using a shelterwood system in mixed conifer stands. The spruce-fir stands would be clearcut and converted to forage. Mature and over-mature timber would be completely removed during the first five periods, with harvest diminishing after the fifth decade. The result would be coniferous forest stands of very open and park-like character with more ground cover in the form of grass and herbs. These would be less susceptible to wildfires once slash has been properly treated. Until slash is properly disposed of, insect problems might increase. Wildlife habitat diversity would diminish.

Under Alternative C, no sawtimber harvest will occur, and the coniferous forest stands will eventually approach the state normally found in wilderness or unmanaged situations. Trees will be removed if they are hazardous to public safety. Insect and disease losses would probably increase, resulting in increased fire hazards.

In Alternative E, sawtimber harvest will be higher than Alternatives A, C, and D, and will be lower than Alternative B or the Proposed Action. Harvest methods used would be group selection or small clearcuts of not more than 40 acres in size. This alternative provides for lower stocking (BA 120 square feet or less) and higher harvest than the current situation. This stocking level would be achieved through entries managed on a 20-year cycle with precommercial thinning. Overall stand health and vigor will be improved.

Under all alternatives, artificial reforestation activities would be the exception rather than the rule. Natural regeneration will be emphasized.

Under all alternatives, Christmas trees will be made available to the public on a limited basis. The number to be harvested and the location will depend on management strategies being used to maintain fuelbreaks and meadows or make wildlife habitat improvements.

Table 58 shows the available sawtimber volume for each alternative.

Table 58. Average Annual Sawtimber Harvest by Periods

Period		Min.	PA	Alternatives A	B 1/	C	D	E	Max. Timber 2/
1	MCF	0	576	430	715	0	420	469	798
	MBF	0	2880	2150	3575	0	2100	2345	3990
2	MCF	0	576	430	1048	0	420	469	798
	MBF	0	2880	2150	5240	0	2100	2345	3990
3	MCF	0	576	430	1161	0	420	469	798
	MBF	0	2880	2150	5805	0	2100	2345	3990
4	MCF	0	576	430	1264	0	420	469	798
	MBF	0	2880	2150	6320	0	2100	2345	3990
5	MCF	0	576	430	1339	0	420	469	798
	MBF	0	2880	2150	6695	0	2100	2345	3990

1/ Harvest is primarily for the objective of increasing livestock forage. Yield is highly variable between periods and decreases significantly after period 5.

2/ Maximum with non-declining yield.

Fuelwood

Fuelwood will be harvested primarily from the oak and juniper woodland areas of the forest. Other fuelwood from coniferous forest areas will also be made available where feasible. Table 59 shows the projected fuelwood harvest from the woodland areas for each alternative.

Under Alternatives A, E and the Proposed Action, fuelwood will be provided on a sustained yield basis. This level of harvest would require additional roads to access new areas. Under Alternatives C and D, fuelwood would be provided on a declining yield with harvest coming only from areas that now have road access.

Under Alternative B, fuelwood harvest would be used to maximize livestock forage production. As a result, fuelwood harvest would be intensive and would result in modification of some predominately oak, juniper, and mesquite ecotypes to grasslands. By period 5, available fuelwood volumes would be exhausted. Demand for fuelwood would be met in some years, depending on range management needs, but would not be satisfied on a sustained basis.

Under the Proposed Action, and other alternatives except B, fuelwood harvest will be used to maintain and/or improve wildlife habitat by increasing vegetative and wildlife diversity. Total demands for fuelwood would not be met under these alternatives. Total demand could be better satisfied if a commercial fuelwood market was developed to utilize wood fiber from coniferous forest lands that might not be utilized by conventional sawmills.

Under the Proposed Action and all alternatives, fuelwood would be available to residents of Mexico when not fully utilized by U.S. citizens.

Table 59. Average Annual Fuelwood Harvest by Periods

			Alternatives						Max.
		Min. [1]	PA	A	B [3]	C	D	E	Timber [2]
Period									
1	MCF	0	212	234	345	194	196	252	252
	M Cords	0	2.5	2.7	4.0	2.2	2.3	2.9	2.9
2	MCF	0	220	227	350	183	186	253	253
	M Cords	0	2.6	2.6	4.1	2.1	2.2	2.9	2.9
3	MCF	0	233	241	359	139	145	259	259
	M Cords	0	2.7	2.8	4.2	1.6	1.7	3.0	3.0
4	MCF	0	231	239	359	94	103	251	251
	M Cords	0	2.7	2.8	4.2	1.1	1.2	2.9	2.9
5	MCF	0	230	238	359	94	103	250	250
	M Cords	0	2.7	2.8	4.2	1.1	1.2	2.9	2.9

[1] From Low Intensity Benchmark

[2] From Alternative E. Represents sustained yield.

[3] After fifth decade, harvest declines significantly, due to completion of work to increase livestock forage.

Other Forest Products

In the Proposed Action and all alternatives other forest products, such as beargrass and manzanita, will be made available to anyone, including residents of Mexico, when not fully utilized by U.S. citizens. Removal of cactus, succulents, and other protected species requires permits from both State agencies and the Forest Service. Forest Service permits will be issued for areas where removal is consistent with other management objectives.

PLANT AND ANIMAL DIVERSITY

A diversity of habitats is generally believed to indicate a healthy situation for wildlife. Changes in diversity can be expected to vary with management alternatives. Trends can be determined from these overall changes. Estimates of "edge effect" or ecotone can be made, and the spatial distribution of seral vegetative stages estimated and evaluated to refine measures of diversity.

Table 60 shows the predicted changes by period 5 in acres of existing ecosystems (Alternative A) for each Alternative. The changes are insignificant with the exception of Alternative B and D. Increased livestock management in Alternative B results in more grassland ecosystems at the expense of woodland ecosystems. Overall reduced management activity in Alternative D results in a shift from desert grassland to desert scrub.

Table 60. Changes in Vegetative Diversity by Terrestrial Ecosystem by Period 5 (Shows actual changes in acres from Alternative A, current management, over five periods.)

Terrestrial Ecosystem	Proposed Action	A	B	C	D	E
Desert Scrub	-266	227,193	-10247	0	+90000	-400
Desert Grassland	+309	186,188	+10247	0	-90000	+450
Plains Grassland	+650	28,102	+101935	0	0	+800
Mountain Grassland	0	930	0	0	-200	0
Chaparral	-43	78,299	-1690	0	0	-50
Oak Woodland	0	877,279	-97096	0	0	0
Pinyon-Juniper	-650	155,667	-3149	0	0	-800
Aspen-Maple	0	309	0	0	-150	0
Pine-Oak Woodland	0	70,626	0	0	0	0
Ponderosa Pine	0	19,820	0	0	0	0
Mixed Conifer-Spruce-Fir	0	24,642	0	0	+350	0
Desert Willow-Hackberry-Mesquite-Riparian	0	4,669	0	0	0	0
Cottonwood-Sycamore Riparian	0	25,976	0	0	0	0
Oak-Juniper Riparian	0	15,983	0	0	0	0
Maple-Mixed Conifer Riparian	0	10,831	0	0	0	0

Animal diversity changes as represented by effect on management indicator species groups are discussed in the Wildlife and Fish Habitat Section of this Chapter.

Riparian Areas

Since surface water is a scarce resource on the Forest, the 36,807 acres of riparian areas take on special importance. Riparian areas include the surrounding stream banks, lake shorelines and flood plains of perennial interrupted streams and wetlands.

Riparian areas have been damaged from past livestock grazing, intensive recreation use, fire, floods, and poor road location. Permitted livestock use in excess of capacity, low intensity management and the tendency of livestock to concentrate in cool, shady areas where forage and water are plentiful has contributed to the problem, as has the attractiveness of these areas to recreationists. The riparian areas require control of livestock and improved management on the whole watershed and increased regulation of recreational activities, and road locations. The condition of riparian areas will be improved to satisfactory by the end of period 5 in all alternatives.

SOIL AND WATER

Water Yield

Currently the Coronado produces an estimated average annual water yield of 146,200 acre feet. There are no known plans for water storage or transmission facilities.

Most of the water flowing from the forest fails to reach perennial streams and rivers downstream. Surface flow usually sinks into the intermittent stream channels where it recharges the ground water basins. No alternative significantly affects the Coronado's contribution to the ground water resource.

Water Rights

In this part of the Southwest, where water is generally scarce, supplying water needs for Forest activities is often a challenge. Surface water rights and groundwater registrations have been obtained for all recreation uses. Applications, claims and registrations for range and wildlife uses are pending. Sufficient water has been applied for through various State laws to meet Forest needs.

Water Quality

Compliance with the Safe Drinking Water Act is being met in all alternatives with monthly inspections of all potable waters. Waste water from municipalities and from developed recreation and administrative facilities is disposed of in treatment plants approved by the States in all alternatives.

Acid mine drainage through mine tailings cause Harshaw Creek in the Sonoita Watershed to not meet water quality standards. The Patagonia Mountains, where Harshaw Creek rises, were mined intermittently from the 1600's to 1949 primarily for silver, lead, and zinc. Although the mines are now abandoned, the area includes several homes and ranches, and is used increasingly for recreation. A baseline study in Harshaw Creek was conducted to determine sources, levels, and locations of acid drainage in the stream. Data revealed pH measurements ranging from 2.9 to 4.2 directly below three sampled mines. Drainage from tailings contained maximum concentrations of 4,200 mg/l sulfate, 1,860 mg/l iron, and 286 mg/l manganese, while recommended levels for zinc, copper, arsenic, lead, chromium, and cadmium were also exceeded.

Water quality improved to varying degrees at downstream stations as dilution and alkaline geological environment influenced stream chemistry; some metal apparently precipitated while pH increased to an upper range of 6.7 to 7.5. However, lead, manganese, iron, and arsenic remained above drinking water standards 2.6 km downstream from one of the major mines. For more information, see "Acid Drainage from Abandoned Metal Mines in the Patagonia Mountains of Southern Arizona", Coronado National Forest, September, 1982.

Prevention of sedimentation and changes in water temperature and chemical composition is accomplished by the Forest's adherence to "Best Management Practices" as defined by the States and by treatment of the watershed resource as discussed in the following sections.

Watershed Conditions

A watershed is considered to be in unsatisfactory condition if a significant proportion of the watershed is experiencing soil loss in excess of tolerance, and extensive gully systems are present, or gully and stream channels are unstable. Thirty-one percent of the National Forest acres are classed as unsatisfactory watershed condition. Whenever large runoff events occur throughout the Forest, the water is sediment laden to the point of making it difficult to use. All watersheds have excessive erosion and therefore high levels of suspended sediments during high flows.

The acres in unsatisfactory watershed condition have ineffective ground cover, thus soil loss is exceeding tolerance levels and desertification is resulting on some low elevation watersheds. Unsatisfactory watershed conditions and lack of effective ground cover are sometimes the result of past land uses. Improved resource management as anticipated in all alternatives will bring about improvement in overall watershed condition.

Watershed improvement as a result of direct treatment of unsatisfactory watersheds consisting of measures such as pitting, interseeding, shaping, water spreading and travelway closure is planned as shown in Table 61.

Table 61. Average Annual Soil and Water Improvement

Period	Acres by Alternative					
	PA	A	B	C	D	E
1	1053	40	4914	3010	2520	3010
2	1053	40	4914	3010	2520	3010
3	1053	40	4914	3010	2520	3010
4	1053	40	4914	3010	2520	3010
5	1053	40	4914	3010	2520	3010

All alternatives except A provide significant direct and indirect treatment of unsatisfactory watersheds. Alternative D, which emphasizes watershed condition also emphasizes low investment management, such as wilderness management. Such management is not compatible with direct watershed improvement measures.

Most improvements in watershed condition result from indirect effects from balancing permitted livestock use with capacity, treating ranges which have revegetation potential, and intensifying management of range allotments. To a lesser extent travelway closure, road construction to proper standards, surfacing and adequate maintenance of roads also benefit watershed condition. Fire prevention and rehabilitation is necessary on certain sensitive, high elevation watersheds. Anticipated watershed conditions are shown in Table 62.

Table 62. Watershed Acres in Satisfactory Condition

	Thousand Acres by Alternative					
Period	PA	A	B	C	D	E
1	1197	1191	1216	1206	1204	1206
2	1218	1197	1278	1248	1240	1243
3	1251	1208	1355	1300	1288	1286
4	1284	1219	1431	1353	1336	1330
5	1317	1231	1507	1406	1384	1373

Soil

Soil is the basic resource upon which all renewable natural resources are dependent. In a semi-arid climate, such as that found at lower elevations of the Coronado, geologic erosion rates are relatively high as a result of low plant densities. In most areas of the Forest, rock cover increases with slope, effectively protecting soils on sloping areas. Man's activities on land tend to accelerate natural erosion rates, if they are not carefully managed.

Improving range conditions, regulation of wood harvest, and management of roads, trails and recreation areas will result in improving soil stability under all alternatives.

Soil loss is estimated by the Universal Soil Loss Equation (USLE). USLE utilizes several soil and environmental changes, including changes in the amount of effective ground cover, to quantify soil loss.

All alternatives, achieve a satisfactory or better watershed condition on all watersheds by Period 5. This reduces most adverse effects of soil erosion which could, over the long-term, decrease the productivity of numerous forest resources.

Some irreversible soil loss will occur in all alternatives where losses exceed tolerance levels within specific areas and drainages as they adjust to new hydrolic gradients. Alternative A results in the greatest irreversible soil loss.

MINERALS

Impacts to and from mineral prospecting, exploration and development are difficult to predict since the timing and location of work are controlled by the private sector's response to world-wide supply and market prices.

Development of locatable minerals--those minerals covered by the 1872 Mining Law such as gold, silver, lead, uranium, copper, tungsten, molybdenum and others--is governed by regulations requiring submittal of a Plan of Operation to limit environmental impacts. The greatest activity for exploration of copper has occurred on the Nogales and Sierra Vista Ranger Districts. The Nogales District is currently negotiating for a land exchange with Anamax Mining Company for lands needed during the mining of lode deposits on Anamax's patented claims. Much of the other locatable mineral activity is devoted to small mining claimants exploring for gold and silver.

All alternatives have a base level budget which covers timely review and approval of Plans of Operation for anticipated locatable mineral activity. Surface resources are protected to the extent possible under the regulations with Operating Plans including provisions to minimize impacts and to reclaim the areas after exploration or mining has ceased. Mining claims are contested where detrimental surface disturbance is occurring and the claims are suspected of being invalid.

Current administrative mineral withdrawals totaling approximately 22,767 acres for locatable minerals will be maintained under all alternatives until full review is possible under the Federal Land Policy Management Act. The review process requires the participation of the Bureau of Land Management and is scheduled to be completed in the near future. Existing withdrawals from mineral entry are for recreation sites, administrative facilities, observatory sites, and Research Natural Areas. Wilderness areas are legislatively withdrawn.

As shown in Table 63, the biggest amount of withdrawal is for wilderness. Alternatives A and B have the existing wilderness acres withdrawn. The P.A. would recommend 62.0 M Acres for the proposed Mt. Graham Area. Alternative C would recommend 11.0 M Acres for Bunk Robinson, 62.0 M Acres for Mt. Graham and 11.5 acres for Whitmire Canyon. Under Alternative D, the maximum wilderness acres would be proposed. Bunk Robinson would be 16.0 M Acres, Mt. Graham 62.0 M Acres and Whitmire Canyon 12.8 M Acres. Alternative E would only recommend Bunk Robinson for 11.0 M Acres and Mt. Graham for 62.0 M Acres.

Research Natural Areas (RNA) for the most part are already removed from mineral entry or are being considered for withdrawal. Alternative D would increase the number of RNAs by eight. See Table 69 for a complete breakdown.

Present mineral withdrawal for observatories is 4684 acres which is located around the Mt. Hopkins facilities.

Alternatives A and E do not add any areas for Zoological Botanical Areas (ZBAs). The other alternatives provide for ZBAs in South Fork of Cave Creek, Guadalupe Canyon and others. Table 70 shows ZBAs by alternatives.

There will be very little effect on mineral activity regardless of the alternative selected. Bunk Robinson and Whitmire Canyon Wilderness Study Areas are classified as theoretically favorable for prospecting for locatable minerals. All or a portion of those areas would be recommended for wilderness under Alternatives C, D, and E. The proposed ZBA in Cave Creek under Alternative D is classified as theoretically favorable for geothermal prospecting which would result in a large withdrawal (27,000+ acres). Any other withdrawals proposed under any alternative would result in little or no denial of access to areas with either demonstrated or theoretically favorable mineral potential ratings. Only the withdrawal of wilderness in the Peloncillos or the large ZBA in Cave Creek would result in a change to the percentage figures presented in Table 32.

Mineral exploration and development in scenic areas, research ranches, and wilderness study areas is allowable with restrictions. Restrictions would permit only those activities that are required for mineral removal. Removal of vegetation would be curtailed in these areas.

Table 63. Mineral Withdrawals and Restrictions for Locatable Minerals

Area Type	Acres by Alternative					
	PA	A	B	C	D	E
Withdrawals						
Recreation Sites	5707	5532	8282	8282	6563	6563
Research Natural Areas 1/	2010	1850	2200	1660	6564	1660
Admin. Sites	1602	1602	1602	1602	1602	1602
Observatories	4684	4684	4684	4684	4684	4684
International Boundary	586	586	586	586	586	586
Wilderness	401190	339190	339190	423718	429990	412224
Zoological Botanical Areas	4240	0	168	800	36740	0
Totals	420019	353444	356712	441332	486729	427319

Table 63. Mineral Withdrawals and Restrictions for Locatable Minerals (Continued)

Restrictions						
Weeks Law	538	538	538	538	538	538
Scenic Areas	8513	8513	8513	8513	8513	8513
Research Ranch	1635	1985	1635	1985	0	1985
Wilderness Study Areas	0	90800	0	0	0	0
Totals	10685	101836	10686	11036	9051	11036
Outstanding Rights						
San Carlos Mineral Strip	10650	10650	10650	10650	10650	10650
Private	1725	1725	1725	1725	1725	1725
Totals	12375	12375	12375	12375	12375	12375

1/ Overlap within wilderness has been subtracted.

Leasable minerals are generally oil and gas (energy minerals). Because of a national emphasis on energy independence, substantial activity can be expected in this area. The prospecting, exploration and development of leasable minerals are at the discretion of the Federal government. Based upon review of the potential impacts the Forest recommends lease approval to the Bureau of Land Management with stipulations to protect the environment. The BLM administers lease exploration and development with the participation of the Forest Service. Recommendations for availability of lands for leasing and stipulations necessary to protect surface resources are based on the degree of protection needed on each area to meet multiple-use objectives.

All alternatives plan to process energy mineral lease applications in a timely manner and aid the BLM in administration of on-the-ground activities. Areas available for leasing are based on visual quality objectives, proximity to unique resources such as critical wildlife habitat, research natural areas or wilderness areas and developed recreation sites.

Table 64. Leasable Mineral Withdrawal and Restrictions

	Acres by Alternative					
Area Type	PA	A	B	C	D	E
Withdrawn						
Wilderness	401190	339190	339190	423718	429990	412224
WSAs	0	90800	0	0	0	0
Totals	401190	429990	339190	423718	429990	412224
No Surface Use						
RNAs 1/	2010	1850	2200	1660	6604	1660
ZBAs	4240	0	168	800	36740	0
International Boundary	586	586	586	586	586	586
Totals	6836	2436	2954	3046	43930	2246
Limited Surface Use						
Recreation Sites	5707	5532	8282	8282	6563	6563
Administration Sites	1602	1602	1602	1602	1602	1602
Observatories	4684	4684	4684	4684	4684	4684
Scenic Areas	8513	8513	8513	8513	8513	8513
Research Ranch	1635	1985	1635	1985	0	1985
Weeks Law Status	538	538	538	538	538	538
Totals	22679	22854	25254	25604	21900	23885
Outstanding Rights						
San Carlos Mineral Strip	10650	10650	10650	10650	10650	10650
Private	1725	1725	1725	1725	1725	1725
Totals	12375	12375	12375	12375	12375	12375

1/ Overlap within wilderness has been subtracted.

The Wilderness Act of 1964 provides that, subject to valid rights existing prior to December 31, 1983, minerals on lands designated as wilderness is withdrawn from all forms of appropriation under the mining laws, and from disposition under all laws pertaining to mineral leasing.

Currently there is an Environmental Assessment, (E.A.), that is being reviewed by the Washington Office, that recommends no surface occupancy within RNAs. International boundary areas and ZBAs would be leased but also with no surface occupancy.

Areas that may be leased but have limited surface use are recreation sites, administration sites, observatories, scenic areas and research ranches. Limited surface use may depend upon time of year, wildlife needs and research and depends upon each specific area. The Forest recommends limited surface use stipulations for leasable mineral applications.

Access

With either locatable or leasable minerals, a reasonable access will be provided which will take into account soils, wildlife, visual quality objectives, high recreational use areas, and grazing. In almost all cases, except where road construction will be beneficial to the public, a performance reclamation bond will be secured in order to insure that claimant rehabilitates the access roads.

Common variety minerals such as stone, sand, gravel and pumice may be sold at the discretion of the Forest under a permit system or provided free to Federal, State and local agencies for road and highway construction and maintenance. All alternatives provide for removal of common variety minerals within management requirements designed to protect wildlife, soil, water and visual resources.

LANDS AND SPECIAL USES

Lands

Lands administration related activities support other resource management and provide administration for approximately 800 special use permits. All alternatives have support costs built in to provide needed work.

Land Exchange and Acquisition

All alternatives provide for acquisition and disposal of lands by exchange, donation or purchase. Maps are available at the Forest Supervisor's Office for review. Base for exchange lands total 33,330 acres.

Lands suitable for acquisition under the Land and Water Conservation Fund have a high recreation potential. These total 10,094 acres and are identified by the Madera, Santa Catalina, Huachuca Mountain, Dragoon Mountain, and Chiricahua Recreation Acquisition Composites.

Table 65. Changes in Acres of Land Classification

Classification	PA	A	Alternatives B	C	D	E
			(Changes from Alternative A)			
Desirable:						
Priority 1	-41	3020	-41	-41	-41	-41
Priority 2	0	11052	0	0	0	0
Priority 3	-423	28053	-423	-423	-423	-423
Undesirable	+464	24749	+464	+464	+464	+464
Base for Exchange	+3023	33330	+523	+3023	+3023	+523

In Alternative A, the land adjustment priorities will remain as they currently exist. In the Proposed Action and remaining Alternatives, there would be a change in priorities for the following four general areas:

1. East Whitetail Canyon (Chiricahua Mountains)
-- Reclassify approximately 183 acres of National Forest Land as base-for-exchange.
-- Reclassify approximately 464 acres of private land from priority 3 for acquisition to undesirable for National Forest purposes.
2. Holy Cross Area (Santa Catalina Mountains)
-- Reclassify approximately 340 acres of National Forest land as base-for-exchange.
3. Summerhaven (Santa Catalina Mountains)
-- Reclassify approximately 41 acres of private land from priority 1 to priority 3 for acquisition.
4. Rosemont Area (Santa Rita Mountains)
-- Classify approximately 2500 acres as available for exchange (portion of the Anamax selected lands).

There will be no short or long-term adverse impacts on National Forest resource management as a result of these proposed changes.

Right-of-Way Acquisition

The AMS identified over 1000 miles of rights-of-way needed to meet multiple-use objectives on the Forest. Rights-of- way are acquired directly by the Forest or in cooperation with State and County or other agencies. The Proposed Action lists 40 ROWs to be acquired each period as shown in Table 66.

Table 66. Right-of-Way Acquisition

	Average Cases by Alternative each Period					
Period	PA	A	B	C	D	E
All	40	5	37	28	43	30
	(Same level of acquisition all Periods)					

Dollars assigned for ROW acquisition are below needs. The Proposed Action acquires only a small percent of the projected needs. Alternatives A, B, C and E are below this level while Alternative D provides only a little additional mileage. Emphasis will remain on cooperation with the various public road agencies to insure access to National Forest lands.

Land Line Location

Out of a total of 1600 miles of boundary line, approximately 1440 miles remain to be surveyed or resurveyed and posted to standard. Under the Proposed Action, all boundary lines should be established and posted to standard by period 5 as shown in Table 67. With the exception of Alternative A, the other alternatives complete the job earlier.

Table 67. Years to Complete Forest Boundary Posting

	Alternative					
	PA	A	B	C	D	E
Miles/Year	30	28	62	46	40	41
Yrs	48	51	23	31	36	35

These boundaries must be maintained after posting.

Occupancy Trespass

Each alternative contains a base level program for dealing with occupancy trespass. Discovery of additional trespass can be expected in all alternatives because of increases in landlines located.

Electronic Sites

All alternatives provide for continuation of the 12 existing electronic sites. In addition to these sites there are three proposed new sites in all alternatives. (See Table 68) Mt. Hopkins and Mt. Graham should be reserved for Forest Service, Smithsonian Institute and University of Arizona use only.

Table 68. Existing and Proposed Electronic Sites
(Applies to all Alternatives)

Ranger District	Site Name	Status
Douglas	Dragoon	Existing
Nogales	Madera Canyon	Existing
	Mt. Hopkins	Existing
	Melendrez Pass	Existing
	KZAZ Site	Existing
	Castle Dome	Proposed
Sierra Vista	Bear Springs	Existing
Safford	Heliograph	Existing
	Mt. Graham	Proposed
	West Peak	Proposed
	Ladybug Repeater	Existing
Santa Catalina	Radio Ridge	Existing
	Bigelow Peak	Existing
	Soldier Peak	Existing
	Foothills	Existing

Roads already exist to the proposed Mt. Graham and West Peak sites. The castle Dome Site would require road construction which could result in visual impacts. Electronic equipment could create some visual impacts at these sites.

SPECIAL AREA DESIGNATIONS

Research Natural Areas

Research Natural Areas (RNAs) are designated by the Chief of the Forest Service upon approval of an establishment report prepared by the Forest. Table 69 shows the proposed changes to existing RNAs and proposed new additions for each alternative.

Table 69. Existing and Proposed Research Natural Areas

Name	Plant Community	Acres Proposed by Alternative PA	A	B	C	D	E
Existing Areas with Proposed Changes:							
Butterfly Peak	Douglas fir/Silverleaf oak	1000	1000	1000	1000	1000	1000
Goodding	Live oak; riparian hardwood	545	545	545	545	545	545
Pole Bridge	Apache, Arizona, & Chihuahua pine/ oak woodland	550	460	550	460	550	460
Santa Catalina	Encinal/Rockland (oak woodland)	890	4131	890	890	4131	890
Goudy	Southwestern white pine/ mixed conifer	560	560	560	560	560	560
Elgin	Desert grassland	290	290	290	290	290	290
New Proposals:							
Canelo	Evergreen oak savannah	350	0	350	0	350	0
Scotia Canyon	Mexican pine - oak woodland	0	0	0	0	1280	0
Sunnyside Canyon	Evergreen oak savannah	0	0	0	0	559	0
Lochiel	Grassland	0	0	0	0	1280	0

Table 69. Existing and Proposed Research Natural Areas (Continued)

Name	Plant Community	PA	Acres Proposed by Alternative A	B	C	D	E
New Proposals continued:							
Research Ranch (except Canelo/ Elgin RNAs)	Evergreen oak savannah	0	0	0	0	1635	0
Pine Canyon (Peloncillos)	Mexican pine - oak woodland	0	0	0	0	385	0
Upper Guadalupe (Peloncillos)	Bird species	0	0	0	0	1540	0
Pine & Ramanote (Atascosas)	Mexican pine/ oak woodland	0	0	0	0	1/	0
Ramsey Canyon	Sycamore, big tooth maple/pine-oak	0	0	0	0	1/	0
Mt. Graham	Wet Meadows	0	0	0	0	2/	0
Sycamore Canyon (Extension of Goodding RNA)	Sinaloan thornscrub	1470	0	0	0	1470	0
TOTALS		5655	6986	4185	3745	15575	3745
Research Ranch 3/	Grassland and oak savannah	1635	1985	1635	1985	0	1985

1/ These were proposed as zoological/botanical areas in Alternative D.

2/ The Mt. Graham wet meadows will be evaluated as part of the proposed Mt. Graham Astrophysical Area EIS.

3/ This area is not a designated research natural area but is being managed as a research facility under cooperative agreement with the Audubon Society (The 1985 acres includes the Canelo area identified above).

The Santa Catalina RNA size reduction will eliminate conflicts with intent of the RNA system by eliminating a heavily used dispersed recreation area along with the trails.

The proposed Lochiel area has been reviewed on the ground since the RNA proposal in 1974. The Elgin RNA represents the same grassland type and was designated in 1976.

The Sunnyside area was proposed in 1974 to represent the evergreen-oak woodland type. It has since been reviewed on the ground. There is considerable private land within the area. A road runs up the bottom of the canyon. There are existing fences and fence line clearings. There is a large dirt tank and a stock water tank. An oak push took place about 20 years ago. The Canelo area is undisturbed, represents the same type, and is therefore a better choice.

The Scotia area was proposed in 1974 to represent the pine-oak woodland type. It has since been reviewed on the ground. There is only a very small area that contains pine in the extreme upper end. The type is much better represented by the Pole Bridge Canyon addition.

The Research Ranch as a whole does not meet the undisturbed and non-manipulated criteria for RNAs.

Guadalupe Canyon is included as a Zoological-Botanical Area (ZBA) in the Proposed Action rather than an RNA.

The Mexican pine-oak woodland type is better represented in the Pole Bridge RNA addition than in the Pine Canyon (Peloncillos) proposal.

The Pine-Ramanote (Atascosas) and Ramsey Canyons need further evaluation with interested parties in the next planning period. These areas have been proposed for both research natural area and zoological/botanical area status.

The Sycamore Canyon extension of the Goodding RNA is a valuable addition to the system as a representative of a unique vegetative type, even though it is within the recently designated Pajarito Wilderness.

Reductions in available timber or fuelwood, grazing lands and mineral accessibility to protect RNAs are not significant. Management requirements for proposed RNAs are displayed in Chapter 4 of the Proposed Plan.

Zoological-Botanical Areas

Zoological-Botanical Areas (ZBA) would be established in areas of unique biological significance as shown in Table 70. Management constraints are designed for each area to protect the significant biologic values.

Proposed Action
A Zoological-Botanical Area would be recommended for the South Fork of Cave Creek (Chiricahua Mountains), and a Zoological Area for Guadalupe Canyon (Peloncillo Mountains). The South Fork road would remain open to public travel, with speed limits or speed bumps. The campground would be converted to a day use site and rehabilitated, providing water and better sanitary facilities, and with vehicle control to protect soil and vegetation. Grazing will be allowed to 30% use of key species in key areas for a short time in the fall. The two recreation residences would remain. The road, recreation site and recreation residences would be outside the Zoological-botanical designation.

The Zoological designation for Guadalupe Canyon would complement current management direction for the BLM administered Outstanding Natural Area in lower Guadalupe Canyon.

Alternative A
There would be no change from current management. South Fork campground facilities would continue to deteriorate. Vegetation in the campground would continue to be damaged by vehicle use. Conflicts between user groups would continue and probably escalate. Guadalupe Canyon would be managed for riparian dependent species. No ZBAs would be established.

Alternative B
A ZBA would be created in the South Fork, upstream from the campground. There would be no change in management in the canyon below the South Fork Campground. Guadalupe Canyon would be managed as in Alternative A.

Alternative C
A ZBA would be created in the South Fork similar in area to the PA. The road in the South Fork would be closed except to service or maintain recreation areas, and to provide access to summer homes, and for the handicapped. The campground would be converted to a picnic ground. Existing recreation residences would remain in place. A parking lot and sanitary facilities would be built at the junction of the South Fork and main Cave Creek roads. The Arizona Game and Fish Department would be asked to control the hunting and fishing. Guadalupe Canyon would be managed as in Alternative A.

Alternative D
South Fork management would be the same as in Alternative C, except the entire watershed would be in the ZBA. The main Cave Creek drainage would also be included in the ZBA. ZBAs would be established in Clanton Draw, Guadalupe Canyon, O'Donnel Creek, Ramsey Canyon, and Pine-Ramanote Canyons.

Alternative E
This would be the same as Alternative A with no ZBAs established.

Table 70. Proposed Zoological-Botanical Areas

Area	PA	Acres Proposed by Alternative A	B	C	D	E
S. Fork Cave Creek	762	0	168	800	12420	0
Main Cave Creek	0	0	0	0	14720	0
Guadalupe Canyon	3478	0	0	0	3520	0
Clanton Draw	0	0	0	0	650	0
O'Donnel Creek	0	0	0	0	150	0
Ramsey Canyon	0	0	0	0	1700	0
Pine-Ramanote Canyon	0	0	0	0	4130	0
Mt. Graham	0	0	0	0	1/	0
Totals	4240	0	168	800	36740	0

1/ The Mt. Graham spruce-fir forest proposal will be evaluated as part of the proposed Mt. Graham Astrophysical Area EIS.

The upper drainage of the South Fork of Cave Creek is now within the Chiricahua Wilderness. Management direction for this area is adequate to conserve any unique flora and fauna values and allow for public use and enjoyment of these resources. An additional special designation is not necessary. The lower portion of the Canyon receives most of the recreation use and will be recommended for a zoological/botanical designation.

Part of the Main Fork of Cave Creek will be managed for the wildlife values as part of Management Area 3 under the Proposed Action. The rest of the Canyon is within the Chiricahua Wilderness (Management Area 9). Management direction as proposed for Management Areas 3 and 9 is adequate to conserve and emphasize the wildlife values without additional special designations.

The values of Clanton Draw and O'Donnel Creek are closely tied to the existing riparian areas. Management direction for riparian areas emphasizes the unique flora and fauna values. An additional special area designation (zoological or botanical) would possibly draw additional use to these relatively small areas.

Ramsey Canyon is now within the Miller Peak Wilderness. Management direction for this area is adequate to conserve any unique flora and fauna values and allow for public use and enjoyment of these resources. An additional special designation is not necessary.

The Pine-Ramanote Canyon area is relatively inaccessible and any special values can be adequately protected by management direction as provided in the Proposed Action. A special designation at this time would possibly draw additional use to this area.

Both Ramsey Canyon and Pine-Ramanote Canyon have been proposed for research natural area and zoological/botanical designations. The Coronado National Forest will work with interested parties in the next planning period to further evaluate these areas.

Reductions in the availability of timbver or fuelwood, grazing lands, and mineral accessibility due to a special area designation would not be significant under any alternative.

PROTECTION

Air

The impacts of National Forest management activities on air quality will be limited and localized under all alternatives. The primary short term impact will be the suspended particulates resulting from prescribed and unplanned burning of wildland fuels. Prescribed fire is the use of planned or unplanned ignitions of natural or activity fuels under controlled conditions. Factors considered are fuel, soil moisture and weather. The purpose is to confine the fire to a predetermined area and regulate intensity and rate of spread while reducing fuel hazards, and/or improving wildlife habitat, visual quality and forage resources.

Prescribed burning plans are annually submitted to the State of Arizona for review and approval. The total particulate emissions during any period will remain about the same as in the 1970-1980 levels listed in Chapter 3, although they may fluctuate from year to year. The forest will work toward protecting and further refining air quality related values for Class I areas under all alternatives.

Fire Management

Consistent with the resource values involved, each wildfire requires an appropriate suppression response. In the Proposed Action and all alternatives, wildfires will be suppressed as needed to protect life and property. The Proposed Action and Alternatives B, C, D, and E have changes in fire suppression objectives from the current situation (Alternative A). These changes will do primarily two things: 1) reduce suppression costs, and 2) increase acreage burned. The larger acreage burned does not produce long-term adverse effects unless fires are very high intensity.

Table 71. Fire Suppression Objectives by Zone 1/

Zone 1 (High Resource Value)

Danger Class	Appropriate Suppression Responses 2/
Low	Confinement, Containment, or Control
Medium	Confinement, Containment, or Control
High	Confinement, Containment, or Control
Very High	Confinement, Control
Extreme	Confinement, Control

Zone 2

Danger Class	Appropriate Suppression Responses 2/
Low	Confinement
Medium	Confinement
High	Confinement
Very High	Confinement, Containment, Control
Extreme	Confinement, Containment, Control

1/ In all situations wildfire will be suppressed as needed to protect life and property.
2/ See Glossary for definitions.

An appropriate suppression response will be one that most efficiently meets fire management direction under current and expected burning conditions. The response shall be documented and evaluated prior to each subsequent burning period. If the response is no longer consistent with fire management direction, or is anticipated to become inappropriate, the fire shall be considered an escaped fire and an escaped fire situation analysis will be prepared.

Adverse environmental effects which cannot be avoided are: 1) temporary reduction in air quality; 2) temporary to long term reductions in visual quality, wildlife habitat, and recreation opportunities, depending on wildfire intensity; and 3) increased soil loss and decreased watershed condition, depending on fire intensity.

Prescribed fire (lightning or planned ignitions) will be utilized in wilderness areas under all alternatives except A. Prescribed fires will be planned to meet one or more of three objectives: 1) Permit lightning caused fires to more nearly play their natural ecological role within wilderness; 2) reduce the risk from wildfire or its consequences to life and property within wilderness or to resources, life or property outside wilderness; and 3) enhance wilderness values.

Integrated Pest Management

Significant insect infestations for nonwilderness lands are prevented in all alternatives except C through silvicultural activities, slash treatment and through monitoring populations annually by aerial survey and ground checking.

Integrated pest management will largely be ignored in the wilderness areas and the insect and disease problems in these areas will run their course.

There are no adverse or irreversible environmental effects. Wood fiber on accessible lands which is lost to insects and disease is irretrievable, but the volume is considered insignificant.

FACILITIES

Transportation System

Roads

The road system is managed to provide cost effective, and safe transportation for both industrial and recreation users. There are currently 310 miles of arterial and collector roads and 2506 miles of local roads.

Current maintenance levels on some system roads are inadequate. It is not cost effective to maintain these roads at higher levels until drainage and running surface are brought to standard. Some sections of all arterial and collector roads need reconstruction to meet current standards and prevent resource damage. An estimated 800 miles of local roads need drainage structures constructed to prevent further erosion. The following table shows the emphasis to be placed on road and trail maintenance for each alternative.

Table 72. Road and Trail Maintenance Costs

	Average Annual (M) Dollars by Alternative					
	PA	A	B	C	D	E
Roads	516	399	1091	728	660	895
Trails	53	67	109	51	64	165

Although road maintenance funding for the Proposed Action increases by 29% over current funding, there will be a continued disinvestment in the road system. Under Alternative B the roads could be brought back to standard and maintained that way. Alternatives C, D, and E would stop disinvestment but not correct existing conditions.

Some new road construction will be required for access to unroaded fuelwood areas and to the Forest where private owners have prevented access by the public. Forest Highway 39, the General Hitchcock Highway, is scheduled for beginning reconstruction in the first period. Forest Highway funds will be used for this work which may take 6 years to complete. Reconstruction will be along the existing alignment.

Reconstruction of substandard roads, maintenance of roads to standards, and obliteration of unneeded travelways indirectly benefit soil and water resources by reducing erosion and sedimentation.

Trails

Lack of adequate trail maintenance will result in deterioration and subsequent disappearance of remote trails. Inadequately maintained facilities will result in higher and more frequent reconstruction cost.

Trail construction and reconstruction efforts will be concentrated in wilderness areas to maintain wilderness values. See Table 50.

Facilities

New construction will impact the site area. Priorities for construction and reconstruction are: 1) Construct new district office and work center at Sierra Vista. (The Forest is presently negotiating for a land exchange for the existing leased space). 2) Construct new carpenter shop and small office for recreation administration at Sabino Canyon. 3) Separate living, work and public contact areas at Palisades work center. 4) New administrative offices and work center for Nogales. 5) Upgrade Loma Linda Water System. (Work is presently being done. This is primarily a recreation water system.)

LAW ENFORCEMENT

Illegal occupancy of National Forest lands continues as an increasing problem. Greater numbers of people seem to be moving to remote forest areas with the idea of living off the land under the guise of the mining laws. In addition, people with little or no money are taking up residence because they have no other apparent place to live.

The Proposed Action and Alternatives B, C, D and E provide an adequate level of enforcement throughout the planning period. Alternative A limits enforcement and will reduce the Forest's ability to protect recreation users and to prevent resource loss from theft, vandalism and illegal occupancy of land and campsites.

HUMAN AND COMMUNITY DEVELOPMENT

Manpower programs such as the Youth Conservation Corps (YCC), Senior Community Service Employment Program (SCSEP), Volunteers in the National Forest Program and College Work Study Program as well as other programs have been utilized to enhance local community development, train young people in employable skills and provide needed manpower to accomplish the Forest Service mission. The programs are also important to ensuring equal employment opportunities for women, minorities, elderly and the handicapped.

The programs are controlled by Congressional policy and appropriation and have been decreased in recent years. Because the program does not reflect changes in goods and services produced by the Forest, no alternative addresses this subject.

Contributions of these programs to the resources, uses and communities are substantial, and such opportunities are welcomed and will continue to be used in the management of the Forest.

SECTION B
ECONOMIC AND SOCIAL CONSIDERATIONS

Economic Efficiency and Analysis

National Forest Management Act regulations (36 CFR 210.12) require extensive analysis of economic efficiency in the formulation, estimation of effects and evaluation of alternatives.

Present net value (PNV) was chosen as one measure of economic efficiency. PNV is the discounted benefits less the discounted costs. It measures the net economic benefits to the public for all resources which have a market value or which were given an assigned value in the planning process.

Maximization of present net value was an objective of each alternative modeled in the Forest planning model (FORPLAN). Each alternative, therefore, represents the most cost efficient combination of management prescriptions based on the goals and objectives of the alternative.

PNV was calculated by the model based upon costs for labor, capital and materials used to support the management direction of each alternative and upon revenue generated from the production of goods and services. Costs included such items as budgets for operation, maintenance and investment projects; timber purchaser credit, livestock permittee investment; and Department of Game and Fish investments.

Revenues included market prices for timber, livestock forage, and developed recreation plus assigned prices for dispersed, wildlife and wilderness recreation opportunities. Revenues from mineral and oil or gas production were not included in the model since production is controlled by private sector. Also, mineral revenues would be the same for each alternative and, therefore, would not change the relative ranking of each alternative. Revenues from water production were not included in the model since the yield does not vary between alternatives and would not change the relative ranking.

PNV is not a complete measure of economic efficiency because only the market or assigned prices of outputs for which prices can be estimated are counted as benefits while all costs are included. As a consequence, those alternatives with a relatively greater focus on priced outputs are characterized by the highest PNVs.

Since not all costs and benefits can be priced in the analysis, PNV was not the only index used to develop, compare, and evaluate alternatives. Alternatives were evaluated as to how well they maximized net public benefits. Net public benefits (NPB) is an overall expression of the value to the nation of all outputs and positive effects (benefits) less all associated inputs and negative effects (costs)

whether they can quantitatively valued or not. Net public benefits are measured by both quantitative and qualitative criteria rather than a single measure or index.

Alternatives having the highest PNV may not always provide the highest net public benefits when nonpriced benefits and costs are considered. Chapter 2 provides more detail.

The Maximum PNV Assigned Benchmark was developed to depict the situation where the needs to provide for sustained yield, and for integrated multiple-use management are minimized and the present net value of Forest resources is maximized. It is useful in comparing PNVs of other alternatives considered in detail. There were no constraints on the Maximum PNV Assigned Benchmark. The solution was based on an economic objective to maximize the present net value. The Maximum PNV Assigned Benchmark, therefore, provides the greatest monetary benefits for the costs incurred. PNV in all other alternatives is reduced because the alternatives considered in detail are constrained to meet the objectives and goals of the alternatives including budget limitations and multiple-use sustained yield. Comparing the PNVs of these alternatives to the Maximum PNV Assigned Benchmark provides a measure of the financial tradeoffs or opportunity costs of an alternative.

Benefit/cost ratios were also calculated for each alternative as another measure of economic efficiency. Benefit/cost indicates whether the ratio of benefits to costs justifies the alternatives.

Table 73 shows the present net values and benefit cost ratios for the alternatives. As can be seen, the ranking of alternatives is different depending on the economic criteria used.

A detailed comparison of tradeoffs is summarized in the Present Net Value Tradeoffs section in Chapter 2.

Table 73. Present Value Benefits, Present Value Costs and Present Net Value (Millions of 1980 Fourth Quarter Dollars)

	Max PNV Assigned 1/	Alternative PA	A	B	C	D	E
Present Value Benefits	1263.3	901.5	742.2	1238.1	1262.0	1188.7	1193.4
Present Value Costs	274.8	184.3	183.2	354.8	274.7	245.9	253.0
Present Net Value	988.5	717.2	559.0	883.3	987.3	942.8	940.4
Benefit/cost Ratio	4.60	4.89	4.05	3.49	4.59	4.83	4.72

1/ Max PNV Assigned Benchmark included as a reference point.

Benefits and Costs

Total annual benefits and costs are summarized for each alternative for Periods 1-5 in Table 74. Total benefits are market and assigned values generated by all the priced outputs throughout the planning horizon. (See Appendix B for display of benefit prices.) Cash receipts are the revenues collected for timber, grazing, land uses, mineral exploration and recreation uses and are annually returned to the U.S. Treasury. Total costs are the anticipated Forest Service budgetary appropriations along with "Other" and "Other Investment" costs. Forest Service (FS) costs are the average annual appropriated budget and is broken into capital investment and operation and maintenance (O&M). Capital investments are for major road, recreation and administrative facility construction and reconstruction. Other costs include fire fighting funds and Game and Fish Department costs. Other investments include range permittee investments and timber purchaser credit. All values are shown in thousands of dollars per year.

Table 74. Financial Summary of Alternatives - (Thousands of Dollars per Year)

Period	Benefit/Costs	Alternative PA	A	B	C	D	E
1	Total Benefits	28200	23900	37500	37900	36600	36800
	Cash Receipts	824	817	872	841	837	842
	Total Costs:	7396	7278	14187	11013	9811	10056
	FS Costs (Budget)	5997	5751	12628	9653	8402	8639
	Capital Investments	234	59	1907	1909	875	875
	Operation & Maintenance	5763	5692	10721	7744	7527	7764
	Other Costs	1264	1393	1423	1237	1286	1288
	Other Investment	135	134	136	123	123	129
2	Total Benefits	32600	27300	44700	45400	43100	43300
	Cash Receipts	819	813	949	867	851	856
	Total Costs:	7476	7424	14549	11152	9984	10265
	FS Costs (Budget)	6076	5897	12991	9792	8575	8849
	Capital Investments	234	59	1907	1909	875	875
	Operation & Maintenance	5842	5838	11084	7883	7700	7974
	Other Costs	1265	1393	1422	1237	1286	1287
	Other Investment	135	134	136	123	123	129
3	Total Benefits	37500	30800	52200	53200	49900	50100
	Cash Receipts	837	836	1030	915	882	896
	Total Costs:	7429	7435	14380	11072	9918	10235
	FS Costs (Budget)	6030	5908	12821	9712	8509	8818
	Capital Investments	234	59	1907	1909	875	875
	Operation & Maintenance	5796	5849	10914	7803	7634	7934
	Other Costs	1264	1393	1423	1237	1286	1288
	Other Investment	135	134	136	123	123	129
4	Total Benefits	43200	35000	60500	61800	57400	57600
	Cash Receipts	859	859	1081	971	924	944
	Total Costs:	7378	7414	14185	10986	9852	10175
	FS Costs (Budget)	5978	5886	12626	9625	8443	8758
	Capital Investments	234	59	1907	1909	875	875
	Operation & Maintenance	5744	5827	10719	7716	7568	7883
	Other Costs	1265	1394	1423	1238	1286	1288
	Other Investment	135	134	136	123	123	129
5	Total Benefits	49900	39800	69800	71600	66100	66300
	Cash Receipts	873	872	1121	1020	957	972
	Total Costs:	7432	7435	14271	11075	9970	10286
	FS Costs (Budget)	6033	5907	12713	9715	8561	8870
	Capital Investments	234	59	1907	1909	875	875
	Operation & Maintenance	5799	5848	10806	7806	7686	7995
	Other Costs	1264	1394	1422	1237	1286	1287
	Other Investment	135	134	136	123	123	129

Returns to the Treasury and Counties

Cash receipts collected for timber, grazing, land uses, minerals, and recreation uses are returned to the U.S. Treasury. Each year the U.S. Treasury returns 25 percent of these gross revenues to the states for disbursement to counties based on the percentage of the National Forest acreage within the county.

Counties also receive payments in lieu of taxes. This program is administered by the Bureau of Land Management, Department of Interior. The program is dependent on annual Congressional appropriations rather than Forest receipts and, therefore, are not included in the analysis.

Estimates of U.S. Treasury receipts and returns to the counties are based on returns generated by timber and fuelwood harvest, grazing use, mineral royalties and developed recreation use. These figures, as shown in Table 75, are for comparative purposes only. As estimates, the figures are not a contract between the U.S. Government and the counties to provide the amount of funding displayed. Changes in market prices and willingness to purchase by the private sector based on period can cause widely fluctuating revenues.

Table 75. Estimated Average Annual U.S. Treasury Revenues and Return to Counties (Thousand Dollars)

	Alternative					
	PA	A	B	C	D	E
Period 1						
Treasury	824	817	872	841	837	842
County	206	204	218	210	209	211
Period 2						
Treasury	819	813	949	867	851	856
County	205	203	237	217	213	214
Period 3						
Treasury	837	836	1030	915	882	896
County	209	209	257	229	220	224
Period 4						
Treasury	859	859	1081	971	924	944
County	215	215	270	243	231	236
Period 5						
Treasury	873	872	1121	1020	957	972
County	218	218	280	255	239	243

Social Effects

A social impact analysis was completed for the counties in Arizona and New Mexico which include the Coronado National Forest. The total study area included seven counties: Cochise, Graham, Greenlee, Pima, Pinal and Santa Cruz Counties, Arizona; and Hidalgo County, New Mexico. A computer input/output model (IMPLAN) was utilized to determine the socio-economic effects of the alternatives.

The seven county study area was subdivided into two principal subareas by grouping counties: Subarea 1 included Pima and Pinal Counties and Subarea 2 included Graham, Cochise, Santa Cruz, Greenlee and Hidalgo Counties.

Through the use of the IMPLAN model, industrial employment sectors most likely to be affected by Forest Service management activities and outputs were analyzed. The outputs and industrial sectors used in the analysis are discussed in Appendix B.

Other variables considered in the analysis were community lifestyle, organization, land use pattern, attitudes, values and minority relations. These variables, when combined with employment, income and population are indicative of community stability. One of the basic objectives of Forest management is the promotion of community stability.

Table 76 displays changes in employment attributable to outputs and activities produced by the Coronado National Forest for Periods 1 and 2.

Table 76. Changes in Annual Employment and Income During Periods 1 and 2 in the Zone of Influence Attributable to the Coronado National Forest.

Period 1 - Pima/Pinal Counties	Total [1] Employment	Employment Sector: Timber & Firewood	Livestock	Tourism	Other	Income [2] Million 1977$
Total Counties [3]	123623	389	172	13168	109894	2343.3
Portion Attributable to Coronado National Forest [4]						
Alternative A	1554	1	16	435	1102	24.0
Changes from Alternative A						
Proposed Action	+102	0	0	+27	+75	+1.6
B	+136	0	+1	+33	+102	+2.3
C	+99	0	0	+26	+73	+1.6
D	+94	0	0	+24	+70	+1.5
E	+94	0	0	+24	+70	+1.5
Period 1 - Hidalgo/Graham/Cochise/Santa Cruz/Greenlee Counties						
Total Counties [3]	23095	0	329	2326	20440	402.2
Portion Attributable to Coronado National Forest [4]						
Alternative A	3266	0	82	901	2283	45.4
Change from Alternative A						
Proposed Action	+70	0	-11	+23	+58	+.7
B	+335	0	-9	+75	+269	+4.9
C	+230	0	-11	+67	+174	+3.0
D	+148	0	-11	+45	+114	+1.8
E	+148	0	-11	+45	+114	+1.8

Period 2 - Pima/Pinal Counties	Total [1] Employment	Employment Sector: Timber/ Firewood	Livestock	Tourism	Other	Income [2] Million 1977$
Portion Attributable to Coronado National Forest [4]						
Alternative A	1791	2	17	506	1266	27.5
Change from Alternative A						
Proposed Action	+118	0	0	+32	+86	+1.9
B	+151	0	0	+39	+112	+2.5
C	+144	0	0	+39	+105	+2.3
D	+134	0	0	+36	+98	+2.2
E	+134	0	0	+36	+98	+2.2
Period 2 - Hidalgo/Graham/Cochise/Santa Cruz/Greenlee Counties						
Portion Attributable to Coronado National Forest [4]						
Alternative A	3741	0	83	1050	2608	51.5
Change from Alternative A						
Proposed Action	+168	0	-13	+52	+129	+1.9
B	+445	0	-19	+115	+349	+6.1
C	+423	0	-12	+123	+312	+5.5
D	+289	0	-14	+88	+215	+3.6
E	+289	0	-14	+88	+215	+3.6

[1] Annual average number of jobs. Includes part-time and seasonal. A zero equals no change from alternative A.

[2] Model in terms of 1977 economic data. If income were indexed in current dollars, the relative ranking of alternatives would remain the same, since income figures would be multiplied by the same factor.

3/ Total employment and incomes existing in that group of counties in 1977.

4/ Portion of County employment and income attributed to Coronado National Forest. Employment is a potential figure only; there is no guarantee that this amount of employment would occur.

As Table 76 displays, all alternatives would provide some very small increases in employment and income. These increases, however, would be insignificant. As a result of the small changes in employment and income for all alternatives, there are no expected changes in community stability within the study area or subareas.

Communities will not change as a result of Forest management direction proposed in any of the alternatives. Political and social organization will not be affected and land use patterns are not expected to change. Peoples' attitudes and values may change to some degree through their interpretation of (but not as a result of) management decisions. Minority relations within individual communities will remain unchanged.

The economies of urban areas such as Tucson, Nogales, Green Valley, Sierra Vista, Safford, and Douglas will not be affected in any way as a result of the alternatives considered. Since industry's selection of relocation sites are based at least partially on available amenities, community lifestyle could be affected by alternatives which would fail to provide for additional recreation opportunities, to keep pace with expanding population, or which would fail to provide for an adequate transportation system and adequate access. Alternatives which yield lower amounts of fuelwood could affect the lifestyle of rural people who depend on it for heating or cooking. Individual businesses in villages such as Portal, Rodeo, and Bonita, do benefit from visitors in the National Forest, whether for hunting, camping, birdwatching, or other pursuits. This in turn, benefits the other village residents by stabilizing the availability of their services.

In summary, the Coronado National Forest is important to individuals and some small communities in and adjacent to the National Forest. It is economically important to individuals and their families and is a stabilizing influence for business and small communities near the Forest. However, for the most part, the variations between alternatives are not so large as to have a great influence on the social or economic well-being of the area as a whole. The Proposed Action probably best matches the needs of both people living in the rural areas and the urban dwellers.

Minorities and Women

All direct Forest Service programs and activities shall be planned and administered to ensure that the benefits therefrom are made available to any member of society on an equal basis without discrimination or bias. Programs shall be changed or redesigned to implement affirmative action plans which recognize needs of minorities, women, and handicapped persons, and to equalize participation and benefits.

A lesser amount of wood harvest under Alternatives C and D could reduce opportunities for fuelwood needed for heating by many low income and retired people, many of whom are women or members of minority groups.

Except for this, none of the proposed management alternatives is expected to result in any significant change in present use of the National Forest lands or products by minorities. National Forest opportunities will continue to be equally available to all legal residents of the United States.

Under all alternatives facility construction will accommodate handicapped persons.

Native Americans

The American Indian Religious Freedom Act requires that federal agencies evaluate their policies and procedures in consultation with leaders of traditional religions in order to determine mitigation necessary to protect and preserve Native American religious practices.

The northern end of the Santa Teresa Mountains will be transferred to the San Carlos Indian Reservation if enacting legislation is passed. The Coronado National Forest is cooperating with Congress in this effort.

The Nogales District trains a group of fire fighters from the San Xavier Reservation. This would continue under all alternatives.

All alternatives continue to protect Native American religious sites and areas through cultural resource surveys. Strengthened communications with the tribes will ensure that execution of any alternative protects legal rights of Native Americans and considers impacts on local tribes and reservations as neighboring land managers and residents.

SECTION C OTHER CONSIDERATIONS

Comparison with Regional Guide

The Southwest Region through the Regional Guide assigns each Forest a share of the National 1980 RPA Program targets. Table 77 compares the alternatives to the targets assigned for Periods 1 and 5, respectively.

All alternatives fail to meet RPA targets in developed recreation and permitted livestock use. This is because the RPA targets are higher than the Benchmark levels for these resources and, therefore, are outside the decision space for alternatives. (See PNV Tradeoffs Discussion in Chapter 2.)

Mineral operating plans are based on projections of activity from historical data. The number of plans could fluctuate widely because of the speculative nature of mineral development. Land purchase is accomplished with Land and Water Conservation Funds. These funds have been severely cut back. Estimates are based on acreages ear-marked for Land and Water Conservation Funds purchase and are averaged over the planning period.

Table 77. Comparison of RPA Targets with Average Annual Outputs for Periods 1 & 5

Output/ Activity	Unit of Measure	Period 1	Alternative					
		RPA Target	PA	A	B	C	D	E
Recreation								
Developed	MRVD	1715	1317	1287	1547	1547	1435	1435
Dispersed 1/	MRVD	933	1488	1423	1472	1511	1517	1502
Wildlife Habitat Improvement	MAcEq 2/	12.4	12.2	8.8	5.5	42.3	20.8	17.2
Permitted use	MAUM	401	350	350	357	353	352	353
Timber								
Sales	MCF	0	576	430	715	0	420	469
Reforestation	AC	119	0	0	0	0	0	0
TSI	Ac	203	48	103	205	0	101	101
Water Meeting Quality Goals	MAcFt	88	108	108	108	108	108	108
Improved Watershed Condition	Ac 3/	712	1053	40	4914	3010	2520	3010
Mineral Leases & Permits	Plans	192	281	281	281	281	281	281
Land Purchase & Acquisition	Ac	375	10	2	5	10	20	10
Fuel Treatment	MAc	1.6	4.4	4.4	4.4	4.4	4.4	4.4
Trail Const./ Reconstruction	Mile	3.8	1.5	0	1.5	1.5	1.5	1.5

Table 77. Comparison of RPA Targets with Average Annual Outputs for Periods 1 & 5 (Continued)

Output/ Activity	Unit of Measure	Period 5 RPA Target	Alternative PA	A	B	C	D	E
Recreation								
Developed 1/	MRVD	2655	1565	1435	2715	2715	2152	2152
Dispersed 1/	MRVD	1125	3202	3053	3131	3262	3282	3237
Wildlife Habitat Improvement	MAcEq 2/	4.2	13.2	8.8	5.5	43.4	20.8	17.2
Permitted Use	MAUM	449	360	370	406	376	372	377
Timber								
Sales Offered	MCF	0	576	430	1339	0	420	469
Reforestation	AC	210	0	0	0	0	0	0
TSI	Ac	47	48	103	205	0	101	101
Water Meeting Quality Goals	MAcFt	105	108	108	108	108	108	108
Improved Watershed Condition	Ac 3/	820	1053	40	4914	3010	2520	3010
Mineral Leases & Permits	Plans	293	398	398	398	398	398	398
Land Purchase & Acquisition	Ac	4	10	2	5	10	20	10
Fuel Treatment	MAc	2.6	4.4	4.4	4.4	4.4	4.4	4.4
Trail const./ Reconstruct	Mile	5.4	5.5	0	5.5	5.5	5.5	5.5

1/ Includes dispersed, wilderness, hunting, fishing, and nongame use.

2/ Acre equivalents of direct wildlife habitat improvement are calculated on the basis each water equals 640 acres equivalents (AcEq) and other improvements equal 5 AcEq.

3/ Includes only direct soil and water improvements.

Prime Farmlands, Wetlands and Floodplains

There are no prime farmlands within or adjacent to the Coronado National Forest, so no effects were estimated.

No significant adverse effects on wetlands or floodplains are anticipated. Floodplains and wetlands will be protected in all alternatives through direction contained in the management prescriptions. Wetland protection (as required by Executive Order 11990) will be provided by ensuring that new construction of roads, campgrounds and buildings will not have adverse effects on wetlands. In addition, wetland evaluation will be required prior to issuing special use permits in areas where conflicts with wetland ecosystems may occur. Specific standards and guidelines were designed to conserve riparian areas and protect floodplain values (as required by Executive Order 11988). Protective measures for riparian areas include buffer filter strips, stream channel stability maintenance, instream flow maintenance and resource management that meets wildlife, visual and riparian

ecosystem goals. Floodplains will be managed by locating critical facilities out of floodplains or by using structural mitigation measures (e.g., deflection structures, riprap). Floodplain "parity" will be maintained in land exchange.

Energy Efficiency

Estimates of energy consumption by alternative include energy used to provide goods and services on the Coronado National Forest. These estimates are gross predictions, since few records or literature exist to develop energy consumption estimates for many of the Forest activities. Estimates for energy consumed were considered for livestock grazing, recreation, timber and fuelwood activities, and road construction, reconstruction, and maintenance.

The capability of the Coronado National Forest to produce energy exists in two areas: coal, oil, gas and uranium production; and wood residues burned to generate energy.

Differences in energy consumption and production between alternatives were considered to be insignificant.

SECTION D
SUMMARY OF
EFFECTS

Relationship Between Short-Term Uses of Man's Environment and Enhancement of Long-Term Productivity

The relationship between the short-term uses of man's environment and the maintenance and enhancement of long-term productivity is complex. For the purposes of this assessment, short-term uses are those that will generally occur during the first ten year time period on some part of the Coronado National Forest.

"Long-term" refers to the time after the first 10-year period of plan implementation. Productivity refers to the capability of the land to provide market and amenity outputs and values for future generations. Soil and water are the primary factors of productivity, and represent the relationship between short-term uses and long-term productivity. The quality of life for future generations will be determined by the capability of the land to maintain its productivity. The land allocations and permitted activities must not significantly impair the long-term productivity of the land.

Any proposed Forest Plan should incorporate sustained yield of resource outputs while maintaining productivity of the resources. The specific direction and mitigation measures included in the management prescriptions ensure that long-term productivity will not be impaired by the application of short-term management practices.

Each alternative was analyzed to assure that the management standards and guidelines could be met. The alternative was changed if some aspect did not meet these requirements. Thus, in every alternative, the Coronado National Forest's long-term productivity is assured. Alternative B has the highest level of short-term uses, as reflected by the acres of vegetation treatment, and therefore results in higher levels of short-term consequences such as visual impact and increased sedimentation.

As stated earlier, the effects of short-term or long-term uses are extremely complex and depend on management objectives and the resources to be emphasized.

The management prescriptions and effects of the Forest Plan implementation will be monitored to provide data to assure that standards for long-term productivity will be met.

Irreversible and Irretrievable Commitments of Resources

The term "irreversible commitment of resources" refers mainly to actions which disturb a resource to the point that renewal can occur only over a long period of time and/or at great expense or to nonrenewable resources. Measures to protect resources that could be irreversibly affected by other resource uses were incorporated in the management prescriptions and apply to all alternatives.

Some irreversible soil loss will occur in all alternatives on localized areas. Development of mineral resources is an irreversible commitment of resources, since the minerals are no longer available for future use once they are extracted. Normally, the role of the Forest Service is to manage the surface resources to minimize adverse environmental impacts in the exploration and development of the mineral resources. The one exception is the extraction of gravel and rock for construction purposes. This can be considered an irreversible commitment of the resource, although the amount of this use would be very minor and not vary significantly among alternatives.

Irretrievable commitment of resources is defined as the production or use of renewable resources that are lost because of a land use decision. This represents opportunities foregone for the period of time that the resource cannot be used.

Decisions that forego the production or use of renewable resources for relatively long periods of time include special area designations such as wilderness or research natural areas, road construction or reconstruction, and developed recreation site construction.

Alternatives A, C, and D result in the highest acreages of special area designations which reduce the output levels of some noncompatible resource uses. The Proposed Action and other alternatives are relatively equal.

New road construction will be limited in all alternatives to local minimum standard roads. This will not vary significantly between alternatives. Reconstruction of major roads varies between alternatives, but the reconstruction is limited to existing disturbed areas.

Alternatives B and C, result in the largest acreage of new recreation site developments. Alternative D and E propose moderate amounts of new development. The Proposed Action provides the least amount of new development except for Alternative A which results in no new development.

These commitments are irretrievable in the sense that opportunities are foregone rather than irreversible, since they could all be reversed, although not without great expense.

Trees on steep slopes not economically accessible represent an opportunity foregone, since mortality is not salvageable. The commitment is irretrievable rather than irreversible, because future technological advances could make harvest of these areas economically feasible.

The difference between output levels under a given alternative and the higher levels that could otherwise be produced also represents an irretrievable commitment of resources. For example, a low level of forage use for livestock grazing or a low level of fuelwood harvest could be increased in the future based on the application of different management prescriptions, but the outputs between now and then would be "lost" or not available for use. Therefore, the maintenance of future options and the present ability to utilize the resources to the fullest often conflict with one another. One purpose of Forest planning is to provide a mix of uses now and in future time periods that balance the needs of both current publics and future generations.

Table 78. Average Annual Irretrievable Resource Commitments by Period 5.

Output/ Activity	Unit of Measure	Highest Output/Activity	Proposed Action	Irretrievable Commitment
Recreation				
Dispersed	MRVD	1888	1798	90
Wildlife	MRVD	698	646	52
Wilderness	MRVD	813	758	55
Developed	MRVD	2715	1565	1150
Range				
Permitted Use	MAUM	406	360	46
Capacity	MAUM	406	360	46

Table 78. Average Annual Irretrievable Resource Commitments by Period 5. (Continued)

Output/ Activity	Unit of Measure	Highest Output/Activity	Proposed Action	Irretrievable Commitment
Timber [1/]				
Sawtimber	MBF	2880	2880	0
Firewood	MCF	250	230	20
Water yield	MAcFT	146	146	0

[1/] Alternative B was not used for these calculations since it represents a departure from long term sustained yield for wood products.

Adverse Environmental Effects That Cannot Be Avoided

Implementation of any of the alternatives will result in some adverse environmental effects that cannot be avoided. However, application of the management prescription standards and guidelines is intended to limit the extent and duration of these effects.

Activities occurring on the Coronado National Forest will cause some degree of environmental impact. The degree or severity of the adverse effects can be minimized by adhering to the direction in the management prescriptions, but some impact generally cannot be avoided if any management activities occur. These effects include:

Recreation - Project activities such as timber sales and road construction temporarily disrupt recreation uses by reducing or changing the type of recreation use that previously occurred on the area.

Visual Resources - Temporary reduction of visual quality prior to slash treatment and revegetation of disturbed areas on timber and fuelwood sales, and road construction and reconstruction projects. Decreased visual quality where corridors, mining activity, and electronic sites are located.

Cultural Resource - Due to increases in recreation use and other forest management activities, there could be inadvertent disturbance of prehistoric or historic evidence of early man's occupancy on the Forest. However, management standards and guidelines are designed to protect such sites.

Wildlife/Fish - Increased human activities in project areas may temporarily displace wildlife. Roads may have a longer impact on wildlife due to human activities associated with new access into areas previously unroaded and improved access into areas that previously had low standard non-surfaced roads. Intensified livestock production could displace some species even while increasing habitat for others. Some indicator species will be displaced temporarily during resource project activity.

Range - Recreation and fuelwood cutting may have a short-term disruptive effect on livestock distribution and forage utilization. There may also be a short-term decrease in available forage because of disturbance by equipment and accumulations of slash.

Diversity - There will be temporary changes in the number of acres of vegetation types as well as seral stages during project work in all alternatives.

Soil and water - Lowered water quality in some riparian areas because of sedimentation and fecal coliform contamination from geologic erosion and also livestock grazing and recreation use in excess of capacity. Persistence of soil loss in some areas until livestock grazing is balanced with capacity, drainages have adjusted to new hydrologic gradients and watersheds are treated. Reduced water quality because of sedimentation where minerals are open-pit mined or require extensive tail dumps or where extensive oil and gas fields are developed.

Protection (Fire Management) - During the short-term period of wood harvest and thinning operations, there are temporary increases in fire hazards from waste material left on the ground in the form of unmerchantable trees, tops, limbs, and needles.

Air Quality - Silvicultural, road construction and prescribed burning activities cause slight temporary changes in air quality. These changes, which occur only during the actual construction, harvesting and burning, will be in the form of increased smoke and dust in the air.

Facilities (Transportation) - Construction and reconstruction of roads affects aesthetics, erosion, wildlife, noise levels and the number of people in an area.

Community Stability - With a long-term increase in recreation use, communities with rural mountain lifestyles could be adversely affected by increased population and costs of living. Reductions in permitted livestock use in some alternatives could adversely affect local livestock operators.

The elimination of sustained timber harvest levels in Alternative C would have adverse impacts on two local sawmills.

Mitigation measures are included in all management prescriptions in all alternatives. They are intended to mitigate the adverse effects that cannot be avoided.

5. List of Preparers

Name	Discipline and Time on Plan	Education and Experience
Larry S. Allen	Forest Range-Wildlife Staff 1978 to present	B.S. - Forestry Stephen F. Austin State University - 1960 USDA-FS - 27 years
Michael D. Barry	Planner - LMP 1981 to 1984	B.S. - Forest Recreation Washington State University - 1976 Professional Forester Equivalency University of Arizona - 1980 USDA-FS - 8 years
James S. Bedwell	Forest Landscape Architect 1980 to 1983	B.L.A. - Landscape Architecture University of Arizona - 1979 USDA-FS - 4 years
Guy M. Bevers	Planner-LMP 1984	B.S. - Renewable Natural Resources (Forestry) University of Arizona - 1981 USDA-FS - 12 years
Margarett L. Boley	Soil Scientist - LMP 1978-1979	B.S. - Agronomy Southern University, 1977 USDA-FS - 2 years
John M. Borens, Jr.	Forest Lands Specialist 1980 to present	B.S. - Forestry University of Illinois - 1968 M.S. - Multiple-Use Forest Resource Management Southern Illinois University USDA, FS - 11 years
Bernard H. Brunner	Douglas District Ranger 1977 to present	B.S. - Range Management Utah State University USDA-FS - 26 years
Gerald W. Conner	Forest Soil Scientist 1981 to present	B.S. - Soil and Water Science University of Arizona - 1977 USDA-FS - 7 years
Asa D. Crenshaw	Forest Computer Specialist 1978 to present	A.A. - Range Management Eastern Arizona Junior College - 1964 BSPA - Health Service Administration University of Arizona - 1976 USDA-FS - 7 years
Sarah L. Davis	Forest Landscape Architect 1980 to present	B.A. - Psychology University of Maryland - 1972 B.L.A. - Landscape Architecture University of Arizona - 1980 USDA-FS - 7 years
Paul T. Deecken	District Wildlife Biologist 1979 to present	B.S. - Wildlife Management B.S. - Zoology Humboldt State College USDA-FS - 10 years
Carol Ann Rudolph Demuth	District Wildlife Biologist 1981 to present	B.S. - Wildlife Biology University of Arizona - 1979 Post Graduate Range University of Arizona - 1983 to present USDA-FS - 6 years

Name	Discipline and Time on Plan	Education and Experience
Charles A. Dexheimer	District Minerals Staff 1980 to present	B.S. - Forestry Utah State University - 1962 USDA-FS - 24 years
Robert L. Feather	Forest Engineer 1978 to present	B.S. - Civil Engineer B.S. - Biology University of New Mexico - 1954 USDA-FS - 27 years
Margot Garcia	Citizen Participation - LMP 1978-1979 Analyst and Writer - LMP 1981 to 1983	B.S. - Biology University of New Mexico - 1961 M.Sc. - Botany University of Wisconsin - 1965 Ph.D. - Watershed Management University of Arizona - 1980
David R. Harmer	Forest Landscape Architect 1978 to 1981	B.S. - Landscape Architecture California State Polytechnical Univerity - 1972 USDA-FS - 8 years
Peter James	District Recreation, Lands & Timber Staff 1978 to present	B.S. - Recreation Management Northern Arizona University - 1972 USDA-FS - 15 years
Marc G. Kaplan	Forest Soil Scientist 1978 to 1981 Operations Analyst - LMP 1981 to present	B.S. - Watershed Management M.S. - Watershed Management University of Arizona - 1973 USDA-FS - 11 years
Charles E. Kennedy	Forest Wildlife Biologist 1980 to Present	B.S. - Education Northern Arizona University - 1951 B.S. Wildlife Management University of Arizona - 1956 USDA-FS and USDI - Fish & Wildlife Service - 28 years
Robert LeFevre	Forest Hydrologist 1978 to present	B.S. - Forestry Michigan Tech. University - 1972 M.S. - Watershed Management University of Arizona - 1974 USDA-FS - 10 years
Jerry Lockwood	District Range Conservationist 1981 to 1983 District Ranger 1984 to present	B.S. - Forestry Colorado State University - 1970 USDA-FS - 17 years
Steve Loe	Forest Wildlife Biologist 1978 to 1980	B.S. - Wildlife & Range Mgmt. New Mexico State University - 1970 USDA-FS - 9 years
Susan L. McHenry	Planner - LMP 1977 to 1980	B.S. - Outdoor Recreation Colorado State University - 1971 Professional Forest Equivalency - 1973 USDA-FS - 3 years
Rick Newmon	District Range & Wildlife Staff 1980 to present	B.S. - Range Management Abilene Christian University USDA-FS - 11 years
James L. Perry	Forest Recreation & Lands Staff 1978 to 1979	B.S. - Forestry University of California - 1952 USDA-FS - 24 years

Name	Discipline and Time on Plan	Education and Experience
Steve R. Plevel	Planner - LMP 1978 to 1979 District Ranger Santa Catalina District 1979 to present	B.S. - Forest Management Michigan State University - 1960 Post Graduate Work Renewable Natural Resources University of Arizona USDA-FS - 20 years
Lee Poague	Forest Recreation, Lands, Timber, Minerals & Cultural Resources Staff 1979 to present	B.S. Forestry Oklahoma State University - 1957 USDA-FS - 25 years
Rodney V. Replogle	Graphics 1981 to 1983	B.S. - Fine Arts University of Colorado - 1963 Candidate for Masters Degree in Landscape Architecture University of Arizona - 1982 USDA-FS - 15 years
Merton T. Richards	Economist - LMP 1978 to 1979	B.S. - Resource Conservation Forestry University of Montana - 1971 M.S. - Watershed Management, Economics University of Arizona - 1974 USDA-FS - 3 years
W. James Rivers	Forest Lands Specialist 1978 to 1979	B.S. - Forest Management Michigan State University M.S. - Range Management University of Arizona UDSA-FS - 17 years
John E. Roberts	Forest Fire-Timber Staff 1984 to present	B.S. - Forestry Oklahoma State University - 1973 USDA-FS - 11 years
Howard Shupe	Forest Fire Management Staff 1978 to 1980	USDA-FS - 35 years
Sherri Simper (Mauti)	District Range Conservationist 1978 to 1980	B.S. - Range Management Brigham Young University - 1975 USDA-FS - 4 years
Cecil Sims	District Ranger	B.S. - Forest - Range Management Colorado State University - 1960 USDA-FS - 24 years
Elizabeth A. Skinner	Engineering Technician 1981 to 1982	Engineering Study University of Arizona USDA-FS - 4 years
Mark M. South	Minerals Management 1984 to present	B.S. - Forestry University of Arizona - 1971 USDA-FS - 7 years
William Speight	Forest Public Affairs Specialist	B.A. Social Psychology Pask College - 1977 USDA - FS 7 1/2 years
Patricia M. Spoerl	Forest Archaeologist 1984 to Present	B.A. - Anthropology Lawrence University 1971 Ph.D. - Anthropology Southern Illinois University 1979 USDA-FS - 6 years

Name	Discipline and Time on Plan	Education and Experience
Donald J. Thibideau	District Assistant Recreation Lands Staff 1978 to present	B.S. - Forest Resource Mgmt. Southern Illinois University USDA-FS - 3 1/2 years
Duane Thwaits	District Range Conservationist 1983 to present	B.S. - Business Administration Western New Mexico University - 1967 B.S. - Range Science New Mexico State University - 1975 USDA-FS - 18 years
John Turner	Forest Land Management Planner 1978 to present	B.S. - Forest Management North Carolina State University - 1962 USDA-FS - 22 years
Donald Van Driel	District Minerals Staff 1978 to 1979	B.S. - Forestry Northern Arizona University - 1964 USDA-FS - 15 years
Johnny R. Wilson	District Recreation and Lands Staff 1979 to present	B.S. - Forestry Stephen F. Austin State University USDA-FS - 11 years
Don Witt	Forest Fire Staff Management 1979 to 1983	USDA-FS - 28 years
Donald G. Wood	Forest Archaeologist 1978 to 1983	B.A. - Anthropology Sacramento State University - 1967 M.A. - Anthropology University of Arizona - 1973 USDA-FS - 8 years
Lisa Vito	Forester 1983 to present	B.S. - Forest Management Northern Arizona University - 1975 USDA-FS - 10 years

6. Consultation With Others

MAILING LIST

Copies of the Coronado Land and Resource Management Plan and Final Environmental Impact Statement were distributed to the following agencies, governments, Indian Tribes, libraries, individuals, organizations, associations, and businesses.

Recipients of Plan and FEIS

Federal Agencies

U.S.D.A. Forest Service
- Regional Offices
- Southwest Region National Forests
- Washington Office

U.S.D.I. Bureau of Indian Affairs
- Phoenix
- San Carlos
- Sells

U.S.D.I. Bureau of Land Management
- Arizona State Office
- New Mexico State Office
- Safford District
- Las Cruces District

U.S.D.I. Bureau of Mines
U.S.D.I. Fish and Wildlife Service
U.S.D.I. National Park Service
- Chiricahua National Monument
- Coronado National Memorial
- Saguaro National Monument
- Western Archaeological Center

U.S. Department of the Interior
- Pacific Southwest Region
- Washington Office

U.S. Department of the Army, Corps of Engineers
U.S. Department of the Army, Fort Huachuca
U.S. Environmental Protection Agency
- Dallas
- San Francisco
- Washington

State Agencies, Arizona:

Agriculture and Horticulture Commission*
Arizona Office of Tourism
Arizona State Land Department
- Phoenix Office*
- Tucson Office

Arizona Department of Transportation
Arizona Department of Water Resources
Arizona Bureau of Air Quality*
Arizona Game and Fish Department
- Phoenix Office*
- Tucson Office

Arizona Department of Mineral Resources
Arizona State Parks*
- Natural Areas Advisory Council
- State Historic Preservation Officer

Arizona Office of Economic Planning and Development
Arizona Division of Natural Resource Conservation
Arizona Natural Heritage Program*

* To receive documents through the Arizona State Clearinghouse, Office of Economic Planning and Development

State Agencies, New Mexico:

New Mexico Department of Agriculture*
New Mexico Department of Commerce and Industry*
New Mexico Department of Energy and Minerals*
New Mexico Department of Finance and Administration
- State Planning Division*
- Historic Preservation Bureau*

State Agencies, New Mexico (Continued):

New Mexico Department of Health and Environment
  Environmental Improvement Division*
New Mexico Department of Natural Resources
  Administrative Services Division*
  Game and Fish Division*
  State Forestry Division*
New Mexico State Land Office*

* To receive documents through the New Mexico Clearinghouse, Department of Finance and Administration

County Governments, Arizona:

County Boards of Supervisors of following Counties:
  Cochise
  Graham
  Greenlee
  Pima
  Pinal
  Santa Cruz
County Cooperative Extension Service Offices in:
  Cochise County
  Graham County
  Pima County
  Pinal County
  Santa Cruz County
Pima County Assessor's Office
Pima County Department of Transportation and Flood Control
Pima County Parks and Recreation Department
Pima County Planning Department

County Governments, New Mexico:

County Boards of Commissioners of following Counties:
  Hidalgo
  Grant
  Luna
Hidalgo County Cooperative Extension Service

Local Governments in the Following Communities:

Arizona:

  Arivaca
  Benson
  Bisbee
  Bowie
  Douglas
  Green Valley
  Mammoth
  Marana
  McNeal
  Nogales
  Oracle
  Oro Valley
  Patagonia
  Pima
  Safford
  San Carlos
  San Manuel
  San Simon
  Sierra Vista
  St. David
  Sonoita
  South Tucson
  Summerhaven

Local Governments in the Following Communities (Continued):

Thatcher
Tombstone
Tucson
Willcox

New Mexico:

Animas
Lordsburg
Rodeo

Indian Tribal Units:

San Carlos Apache Tribal Council
Papago Tribal Council

Libraries, Public:

Benson, AZ
Bisbee, AZ
Deming, NM
Douglas, AZ
Green Valley, AZ
Lordsburg, NM
Marana, AZ
Nogales, AZ
Oracle, AZ
Patagonia, AZ
Phoenix (Main), AZ
Safford, AZ
Sierra Vista, AZ
Silver City, NM
Tombstone, AZ
Tucson, AZ
Willcox, AZ

Libraries, Other:

Arizona State University
Cochise College
Ft. Huachuca
Governor's Reference Library
Northern Arizona University
Pima College
University of Arizona

Congressional Delegations (Local and Washington Offices):

Arizona:

Hon. Barry Goldwater
Hon. Dennis DeConcini
Hon. Bob Stump
Hon. Eldon Rudd
Hon. Morris K. Udall
Hon. John McCain
Hon. James Kolbe

New Mexico:

Hon. Pete Domenici
Hon. Harrison Schmitt
Hon. Manuel Lujan
Hon. Joe Skeen

Individuals, Organizations, Associations, and Businesses

John Alcock
American Fisheries Society,
Arizona-New Mexico Chapter
American Museum of Natural History,
Southwestern Research Station
Arizona Nature Conservancy
Arizona Outdoor Coalition
Geoffrey and Yvonne Babb
Charles M. Bagley, Jr., M.D.
Roy J. Barker
Arthur Bashor
Brent Bassford
Bella Vista Ranches Inc. of Arizona
Elliott Bernshaw
John J. Brady
Margaret S. Brady
Peter R. Brady
Phil Briggs
Jeanne Broome
P. W. Burbutis
James Cain
William A. Calder, III
Michael E. Cease
Douglas Christie
Eleanor Christman
Margaret G. Christman
Confidential Communications Company
Laurel M. Cooper
Coronado National Forest
Grazing Adivsory Board
Mr. & Mrs. William R. Cowan
Pete Cowgill
Rudolph J. Dalpra
G. H. Daniel
Rudolf Dankwort
John Davis
Defenders of Wildlife
Kitty Deiss
Clark H. Derdeyn
Gabriel A. Desmare
Clyde W. Doran
Raleigh M. Drake
Earth First!
Mark Egger
Dan Fischer
Tim Flood, M.D.
Catherine Forsythe
Steve Forsythe
L. Fuentes-Williams
GEOCON, INC.
Clayton R. Gibson
Kenneth Goldsmith
Richard J. Gordon
(The) Great Bear Foundation
Deb Hall
Walton Hawk
H. E. Hawkes
Helen P. Hiemstra
Sidney M. Hirsh
Samuel Hodesson, D.V.M.
Donn Hopkins
Vaunetter J. & Harold W. Howell
Huachuca Hiking Club

Individuals, Organizations, Associations, and Businesses
(Continued)

Scott Hudson
Intermountain Forestry Services
Michael A. Johns
Bill Kendall
Art Keyes
Douglas Koppinger
Tex Liddle
Robert Locke
James R. Malusa
Maricopa Audubon Society
Mrs. Charles H. Martin
A. J. Matthews
Lester A. Mauk
Matt McWenie
Mexican Wolf Recovery Team
Audrey M. Miller
Ted R. Miller
Walter R. Mills
Marc Mittleman
Kenneth Moeller
Gale Monson
Mt. Graham Conservation Project
Doyle Mullican
Mary Mullican
National Audubon Society -
Appleton - Whittell
Research Ranch Sanctuary
National Audubon Society -
Rocky Mountain Region
National Parks & Conservation Association -
Southwest & California Region
New Mexico State University -
Department of Fishery & Wildlife
New Mexico Wild Turkey Federation,
Las Cruces Chapter
Albert C. Noland
Martin E. Noland
Cecilia Noon
Muriel B. Noon
Jim Notestine
John F. Pamperin
Gene Anne Parker
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R & J Associates
Thomas Val Rauh
Lonnie E. Rawdon
Joe R. Robinson D.V.M.
Dolt Rogers
Kerri Rogers
Sheila Rogers
Barbara & Vincent Roth and
Vera M. Walters

Individuals, Organizations, Associations, and Businesses
(Continued)

Santo Nino Ranch
George Scheffel
Paul R. Scheier
Judy Scott
Teresa E. Scott
Doris Seibold
Margaret Shannon
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Sierra Club,
Grand Canyon Chapter
Sierra Club Legal Defense Fund,
San Francisco
Sierra Club,
Southwest Office
Elwin N. Sire
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Sparks & Siler, P.C.
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Walter R. Spofford
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University of Arizona
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Peter Sundt
John R. Swanson
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Ethel W. Thorniley
Tucson Rod and Gun Club
Tucson Rough Riders, Inc.
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University of Chicago,
Astronomy & Astrophysics Center
Marguerite Vensel
Arthur E. Wainwright
William Waller
Gene I. Wendt
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Wildlife Management Institute
(The) Wildlife Society,
Arizona Chapter
Jeanne Williams
Harriett D. Wilson
Woodward Clyde Consultants
Yuma Audubon Society
William Zaffer
Gabriel Zinsli

Other Individuals, Organizations, Associations and Businesses:

The following were sent a copy of the Record of Decision and notified the F.E.I.S. and Final Plan were available. In addition, individuals, organizations and businesses that expressed specific interest in Bureau of Land Management administered Wilderness Study Areas were sent a copy of the Record of Decision and notified of the availability of the documents.

Individuals

Eli and Catherine Abegg
John Abels
Jefrey and Paula Abramowitz
Rosemary Acedo
Elaine Acosta
Humberto M. Acosta
Jesus Acosta
L. R. Acosta
Ruben Acosta
Sydney Acosta
Edith Adams
Madeline Adams
Norman W. Adams
Warren Adams
Anne Addington
Don Adkins
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Vivian Agner
Virginia Aguila
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Dwight Armstrong
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Merry A. Austin
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Carol Beumler
Henry and Estelle Beumler
Raymond Beving
Betty Beyer
Ernest E. Beyer

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Zane Biglee, Pres.
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Howard and Joy Brimmer
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Michelle Brown
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Susan Bruch
Dale Bruder
Agnes and Otto Bruhlman
Loretta Brutz
Edwina Bryan
Paul Bryant
Paula Bryson
Frank Bucciarelli
John Buchanan
Lou Bucklin

Other Individuals, Organizations, Associations and Businesses: (Continued)

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James Burke
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Tammie Burkett
Mr. and Mrs. Burling
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Jane Burson
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Nicholas Bush
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R.D. Byrd
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Barbi Cabarga
F.J. Cabarga
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Pete Calhon
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Rey Castillo
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Joe S. Causey
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Sherman Cawley
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Dorothy Chasteen
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Darlene Chavez
Edward Chavez
Ignacio P. Chavez
Frances Cheatham
Douglas Cheeseman
Sally Cheney
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Other Individuals, Organizations, Associations and Businesses: (Continued)

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Jim Childress
Helen Childgren
James Childwech
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Stewart W. Christensen
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L.S. and M.U. Conder
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Persis Congdon
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Kevin Conway
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Kathryn and Ken Cook
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Maggie B. Coon
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Carl Cooper
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Marty Cordano
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Ed and Caroline Coury
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Other Individuals, Organizations, Associations and Businesses: (Continued)

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Other Individuals, Organizations, Associations and Business: (Continued)

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Tres English
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Thomas Ervin
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D. and M. Fangmeier
J. J. Fans
Kathleen Fans
Carolyn Farrier
Rex Fassett
Rex and Willetta Fassett
Walter Fathaver
Bob Feather
David Federico
Donna Felder
Judy Scott Feldman
Joseph H. Felix
Sylvia Felix
Mrs. Lucile Fenchen
A. Fennema
Deanna Fenton
Mrs. C. W. Ferguson
Peggy and Gary Ferguson
Karl Ferkel
S. R. Ferrell
Ramona and Ray Ferrin
Dr. Clifford Ferris
Mr. and Mrs. Clyde Fife
Paul Fife
Craig Fifield
Katrina Fillman
Pablo Fimbres
Lora Finfrock
Bill Finkelstein
David Finkelstein
E. F. Finley
Mr. and Mrs. John A. Fioramonti
John and Katherine Fiore
Herman Fiori
Richard and Annette Firth
Raymond Fischer
Elaine Fischler
Dr. and Mrs. Bernard Fisher
Marque Fisher
Shirley Fisher
Steve Fisher
Tome Fisher
Ralph Fisher, Jr.
Ken Fishman
Gordon W. Fiskler
Bea Fitzgerald
Eileen Fitzmaurice
Edwin and Edith Fladdos
Brian Flagg
Clyde Flannagan
Philip and Janet Fleishman
Carroll Fleming
Homer Fletcher
Beverly Flood
Patte Flores
William L. Floyd
Clay Fobes
Catherine Foggella
Donald Fogle
Milan G. Fogleman
Mrs. Edwin Folks
Bernard L. Fontana
Dorothea Fontes
Dr. and Mrs. Ben Foote
R. P. Forbragd
Carol Ford
Mr. and Mrs. Roger Ford
Karen Foress
Ben Forge
Alma D. Forres
Ray Forrest
Robert Forrest
Robert E. Forsman
Joe Forsyth
Kay Forsythe
Nick and Jill Forsythe
Carol Fortier
Marvin and Sorale Fortman
Andrew Foster
Lawrence Foster
Nathan Foster
Roy Fowler
Dan Fralie
William B. Francais
Gerald Frances
Elizabeth Franco
Jose Franco
Phyllis Francom
Stan Francom
G. Franklin
Mamie Franklin
Mark Franklin
William Franklin
David Franz
Marilyn Frecouf
A. A. and D. G. Frederickson
Margaret Frederickson
G. W. Fredrick
Jane Freedlund
Betty Freeman
Gilbert and Myra Freese
Kermit French
Robert A. Frias
Kimberly Frick
David Friedrichs
Donald Fritz

Other Individuals, Organizations, Associations and Businesses: (Continued)

W. R. Frizzell
Forrest Froelich
Mrs. Hugh Fry
William Fuiglein
Toni Fulgeniti
Evelyn Fulginiti
J. E. and N. M. Fuller
Lawrence D. Fuller
Deane Funk
Barbara Furer
Ms. Sue Furnish
Freddie Gabaldon
Meg Gabrielsen
William and Norma Gaddy
Helen Gaggin
Randy Gains
Carl Gajdorus, II
Mr. and Mrs. E. V. Galaz
Maud O. Galaz
Chester Gallach
Ruber Gallardo
Christine Galloway
F. S. Galloway
Helen Galloway
Jose L. Galvez
J. J. and Wilhelmina Ganders
Albert Garcia
Emelio Garcia
Frank Y. Garcia
Jaime and Jose Garcia
Margot and J. D. Garcia
Oscar Garcia
Mr. and Mrs. L. S. Gardner
Stan Gardner
Marjorie Garfinkle
Mr. and Mrs. Arthur Garland
E. June Garrison
Bernice Garvin
Alfred Garwood
Al Gasaway
Frank Gatuirz
Karen Gaudet
Eva Gauia
Kathy Gavin
Mr. and Mrs. Kenneth Gavitt
Tom Gay
John Gayler
John P. Gaytan
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C. C. and Mary Gebhart
Robert J. Geepton
Fern Geeter
Alice Geffen
John M. Gellantoni
C. and R. Genis
Larry and Sharon Gentner
Mr. and Mrs. Virgil Gentner
Alice Genung
Dennis Genzman
Marian Geoff
Herbert Gerdes
Marion Gerhardt
David Gerlich
Marge Germain
Sheila Gershen
Bob Gevion
Theodore Geyler
Richard Giberson
Jim Gierhart
Charles E. Gikin
Ralph Gilbert
Donald Gill
Doug Gill
Edward Gill
Lucy Gill
Mrs. Betty Ann Gille Farkas
Delvar and Sue Gillespie
Ute Gilliam
Bill Gillon
Mr. Gillutz
Kirk Gilmore
Bernice Gin
Don Gingras
Fred and Patricia Ginter
F. E. Gipson
Jesse Girilute
Dr. and Mrs. H. Giron
Darlene Glaesser
Alison Glan
Ernestine Gleason
Eber and Lorna Glendening
Idasel Glenn
M. Y. and W. D. Glenn
Nellie and Lester Glenn
Rex and Laura Glenn
Wendy and Warner Glenn
William E. Glenn
James M. Glennon
Jodean and Lloyd Glover
William Gobey
Mr. and Mrs. James D. Goeller
Fred and Janet Goff
Joseph J. Goff
Mary Kay Gojkovich
Mirian Goldbaum
Robert H. Golden
Lloyd Golder, III
Melivlle Golding
Carole and Walter Golerch, Jr.
Alicia V. Gomez
George Gomez
Grace and Robert Gomez
Kristine Gomez
Linda Gomez
Ramona M. Gomez
Rosie Gomez
Luis Gonzales
Mauricio Gonzales
Rene V. Gonzales
Richard Gonzales
Louis Good
Ruth Good
Verna Good
Niel Goode
Robert Goodrich
Dr. Felix Goodwin
Edwin G. Goodwin
Jean Goodwin
Richard Gorby
Charles Gordon

Other Individuals, Organizations, Associations and Businesses: (Continued)

David Gordon
Judith Gordon
W. H. Gordon
Eric Gormally, M.D.
Joe Gorman
Peter Doudinoff
Helene Gough
Jeanne Graham
Leroy and Jeanetter Grandt
Mr. and Mrs. Theodore Granillo
A. J. Gray
John Gray
Michael Gray
Mario Grecan
Clifford F. Green
Don Green
Frances Green
H. Green
Michael Green
N. and M. J. Green
Royu and Takedo Grenn
Neil Greentree
Kay Gregor
Michael Gregory
Shirley Gregory
James Gregovich
Nick Gregovich
Charles Greifenstein
Bob Gresham
Jean Grieison
Arthur Griesser
Cassie Griffin
Ralph Griffin
Ralph Griffin, Sr.
Mrs. Jo Griffith
H. B. Grim
L. C. Grimble
Paul Grimes
Albert Groff
Dr. and Mrs. Richard Groschupf
Jeff Groschupf
Eric Gross
Jean G. Gross
George Grossman
C. W. Grove
Alan L. Gruel
James and L. J. Gueller
Mr. and Mrs. James Guendelsberger
Patricia Guerra
Lee Gullickson
William W. H. Gunn
Daniel W. Gunther
Janet Guptill
Mary and Robert Gustafson
Augi Gustilo, Jr.
Mr. and Mrs. Donald Guthrie
Frank Gutierez
Gilbert Y. Gutierez
Esther Gutierrez
Jamie Gutierrez
Lynda Bell Gutierrez
Maxine Guy
Robert Guzman
Laverne Gwaltney
Margaret Haas
E. F. Haase
Mitch Habeck
Gail Hacker
Don Hackett
C. B. and Helen Hackney
Joanne Haggerty
Lois Haight
Sandy Hain
Edgar amd Vinetta Hale
Marie A. Hale
Norman and Ruth Hale
Richard Hale
George Haley
Catherine Hall
David Hall
Edward N. Hall
Joseph Hall
Kristi Hall
Mr. and Mrs. Richard Hall
Mr. Hall
Ned Hall
Ruby Hall
Vernon Hall
Lois P. Halland
A. F. Hallett
Elizabeth J. Hallgarth
Donna Halliday
Gunda Halloran
Keith Halpean
Pearl Hamilton
Roger Hamilton
Hugh Hamman
D. F. Hammer
Hazel Hammond
Frances Hamwood
Patricia N. Hand
Dr. E. A. Hankins
Jack Hanna, Jr.
Mike Hannah
Mike E. Hannah
Wayne Hannan
Barbara Hannum
Frank Hansen
Jim Hansen
Mr. and Mrs. Gordon Hansen
Russell Hanson
Jeffrey R. Hardiman
Jim and Reggie Harding
R. M. Hardt
Barry Harelson
Linda Harke
Mark Harkness
W. J. Harmon
Linda Harnell
Mary R. Harper
Leila Harrel
Victor Harrel
Joe Harrelson
Bart Harrington
Tom Harrington
Floyd V. Harris
Levi Harris
Maureen Harris
S. P. Harris
William J. Harrison

Other Individuals, Organizations, Associations and Businesses: (Continued)

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Pat Harrold
Diane and Randall Hart
Shirley Hart
Vivian Hart
Carl W. Hartman
Gayle Hartmann
Fred H. Hartwell
William Hartwell
Tom Hasson
Margaret J. Hasty
Myrtle Hatch
Norman Hatcher
James Hathaway
Paul Hathaway
Dawn Hathcock
Mr. Hauseer
Meda Hawes
Marian A. Hawk
Larry Hawke
Maureen Hawkes
Afelia and C. A. Hawkins
Vickie C. Haycock
William J. Hayden
Alden Hayes
Curtis Hayes
Eric A. Hayes
Huey and Inez Hayes
Tim Hayes
Robert J. Hayes, Jr.
C. and A. Haymore
Thomas S. Haymore
Mrs. Harry Haynes
Deann Haynie
Roger K. Haynie
Morgan and Helen Hays
Polly Hays
Robert L. Hays
T. W. Hectio
William and Sarah Heed
Robert J. Hegedus
Beth Hehma
Mr. and Mrs. Raymond Heidank
John and Jean Heidel
Robert and Kathryn Heineman
Fred and Phillis Helm
Harvey Helm
Wes Helzer
Mike Hembrogh
Nellie Jo Hendricks
Harry Hendrickson
Marlene Hendrickson
H. Thomas Hendrickson, Jr.
Maria Henera
Edward Hennessy
M.L. Henrikson
Albert C. Henry
Sally Henry
Amy Henson
W. G. Henwood
Bonnie Heod
George Herbert
Amie Hergalich
William Herlig
Mariann Hermes
Jesus Hernandez
Manuel R. Hernandez
Prescilla V. Hernandez
Teresa Hernandez
George Hernendez
J. J. Herrman
Betty Hersey
Robert A. Hershet
John Hertzog
Linda Herzog
Albert Hesselberg
John W. Hesser
J. W. Hester
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John Heuvelman
L. F. Hewao
Rick Hewett
Edgar Heylmur
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Terry Hicks
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John Higgins
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Virginia L. Higuera
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Cheryl Hildibrand
Sharon Hile
Don J. Hill
Harry C. Hill
Jeffrey Hill
Joseph Hill
Mrs. Ben Hill
Virginia A. Hill
Tom Hille
Robert and April Hiller
Tony Hills
S. D. Hillyar
Marge and Schuyler Hilts
S. V. Hilts, M.D.
Joe and Gloria Hines
Lenard Hines
Robert J. Hinkle
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J. Houston Hinton
Howard Hintz
Chi Fong Hippard
Alice Hippen
Craig Hipple
Jenny Hirsh
Frank H. Hirst
Paul Hirt
Jack Hixon
Beatrice Hoag
Mildred Hoagland
Gertrude Hochgraf
James H. Hoenes
Allen Hoese
Ms. Martha Hoff
Mr. and Mrs. Jon A. Hoffman
Patricia Hoffman
William Hoffmann
Jean Hogan

Other Individuals, Organizations, Associations and Businesses: (Continued)

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Mrs. Elizabeth Hogan
Mrs. Juls Hoggett
Steve Hogleman
Walt Holberg
Laura Holcomb
Adele Holevas
Family of Holiday/Dryden
Larry and Susan Holladay
W. W. Holland
Dr. Steven B. Hollander, D.P.M.
George B. Hollis
Peter Holm
Ediko Holman
John and Carole Holmes
Betty Holstrom
Rosemary Holquin
Mr. and Mrs. Albert Holter
Mrs. Bonnie Honeycutt
Ray C. Honnas
Jay N. Hoopes
Lamro Hoopes
Lavona Hoopes
Marianne Hopkins
Leonard Horgon
Earl Horley
Goerge Horn
H. K. Horning
Craig Hortman
Scott Horton
Harold Hosteller
Eric T. Hotchkiss
Basil and Irene Houck
Gerald Hougland
Kathryn Houser
Richard Houston
S. Hovemeyor
Freeman Hover
Frank Hovore
Mrs. William Howe
Clay Howell
Joyce Howell
Joseph Hoxie
Mr. and Mrs. Frederick Hoyle
Tom Hoyt
Robert M. Hubbard
Virginia Hubbard
Peter Hubbell
Paul Huber, Jr.
Darrow E. Huchins
Maureen Hudson
Patrick Hudson
Mrs. Louise Hudspeth
Cindy Huebner
Bill Huff
Mr. and Mrs. Richard Huff
Wilma Huggett
Alison Hughes
David Hughes
Madine Hughes
Sheila K. Hughes
Richard Huhn
Goldie Huie
Ted Huish
Audra Huisk

Pauline Hull
John Hummer
Patricia Humphries
Jeff Hund
Margaret Hundley
William Hunley, Jr.
David Hunt
Elizabeth Hunt
Irvin Hunt
Marion J. Hunt
George Hurbert
Manuel P. Hurtado
Mr. and Mrs. Herbert Hustin
Nancy F. Huston
Martha Hyman
James and Maxine Ijams
John Il
Arthur and Nancy Imber
George Inman
Josie and Burgett Irey
Richard Irvey
Royal Irving
John B. Irwin
Eileen Jablonka
James Jablonski
Helen F. Jackman
William Jackman
James E. Jacks
Bessie Jackson
Dorothea Jackson
Goerge and Gail Jackson
H. F. Jackson
Henry and Eleanor Jackson
Keith Jackson
Keith and Ethel Jackson
Lloyd Jackson
Norman L. Jackson
Ronald Jackson
Susan Sellers Jacksons
Casey Jacob
R. T. and E. P. Jacob/Berry
Katharine L. Jacobs
David Jaffiuy
Reynaldo Jalazar
John Jamenta
Kyan James
Marina G. James
Noel James
Dave Jameson
Mr. and Mrs. Harry Janos
J. Pitts Jarvis, Jr.
Wally Jasna
Allen Jaten
Edward Jattje
Richard Jeanne
Arnold Jeffers
Mr. and Mrs. J. R. Jelks, Jr.
Lorie Jenkins
W. Jenkins
Randolph Jenks
Robert Jennings
C. Philip Jenny
Mr. and Mrs. Alford Jensen
Mr. and Mrs. Charles Jensen
Robert Jensen

Other Individuals, Organizations, Associations and Businesses: (Continued)

T. W. Jensen
Monte L. Jent
W. L. Jeppson, Agent
A. A. and Evangeline Jernigan
John W. Jewell
E. C. Jilli
Sherri Jiminez
Robert Jirousek
Marie A. and Mike John
Theresa Johnsen
Ann Johnson
Charles M. Johnson
Emery Johnson
Fawn and Clayton Johnson
Garland Johnson
J. C. and D. L. Johnson
James Johnson
Jeff Johnson
John and Ruth Johnson
Julie Johnson
K. Norman Johnson
Mr. and Mrs. G. R. Johnson
Marshal Johnson
Michael T. Johnson
Peter and Mary Ann Johnson
R. Roy Johnson
Robert Johnson
Ronald and Alice Johnson
Susan L. Johnson
Ted Johnson
V. L. Johnson
Dolores and Warren Johnston
Harry E. Johnston
Willis Johnston
Becky Jones
Emma Jones
Gary Jones
Greg Jones
J. J. Jones
Jack C. Jones
Jay and Joan Jones
Jere Jones
Linda Jones
Mr. and Mrs. Charles Jones
Mary Beth Jones
Pamela Jones
Rick Jones
Robert Jones
Ron Jones
W. Thomas Jones
Mannie Jonsen
Maria Jordan
Lupe and Ramun Jordon
Merry Joslin
M. Joyce
Dan Junior
Beatrice Justus
Dr. Lane Justus
Peter Kadrich
Ken Kaecker
Jean Kaeger
Judith K. Kain
Peter W. Kaine
Deborah Kalar
Bill Kambitch
Rudolph Kambitsch
Oscar and Mary Kandik
Robert Kane
Dr. Richard Kanter
Davisd D. Karber
Mr. and Mrs. Charles Kareiva
Art and Jean W. Karger
Raymond and Elyse Kaufmann
Desmond Kearns
Terry Kearns
La Vena Keel
Mr. and Mrs. Fred Keers
Deway Keith
Susan Kelemen
David Keller
Peter Keller
Austin Kelley
Mark D. Kelley
James M. Kelly
Kathleen R. Kelly
Norma Kelsey
P. M. Kelsey
Sandy Kelso
Kenneth G. Kempson
Calvin Kempton
J. I. and A. H. Kempton
Kent and Patricia Kempton
L. R. and La Ree Kempton
S. A. and M. D. Kempton
Mr. and Mrs. Stephen Kendle
Arleen Kendrick
Allan Kennard
Howard Kennedy
Thelma Kennedy
Meg Keopen
Mary Ker
Laurel Kerman
Willaim Kershner
Arnold Keskulla
M. J. Kessel
John Kessler
Lee B. and Velma Kight
Patricia Killeen
Mr. and Mrs. Gordon Kimball
Mr. and Mrs. Leonard Kimble
Michele Kimble
Ralph V. Kimble
George and Sally King
Harley King
John King
Mr. and Mrs. Charles King
Rose King
Trudy King
William King
A. H. Kinneberg
Steve and Linda Kirpatrick
J. Kirwan
Jack Kiser
Esther Kish
Ruth A. Kish
Linda Kleck
Shirley Kline
Patricia Klinkner
Keith Klump
Elizabeth Knape

Other Individuals, Organizations, Associations and Businesses: (Continued)

Mr. and Mrs. Charles Knapp
Katherine Knez
Dorothy Knight
Knipe/Ure
LTC and M. Lynn Knisley
Sue Knivila
Andi Kobel
Donald G. Koch
Clifford E. Koenig
Ron Koenig
Joseph Kondy
Charles and Linda Koopman
Ed and Kathleen Korbish
William Kornmuller, Jr.
H. T. Kortsen
Alex Kory, Jr.
Helen Kovock
Mr. and Mrs. Kowalcek
Mr. and Mrs. C. T. Kraft
Keith K. Kramer
Peter L. Kresan
Kurt and Maryellen Kressin
John and Mary Ann Krischak
Anna Krizmanich
John Kromko
Mr. and Mrs. William F. Krueger
Mrs. Mary Kruth
G. Donald Kucera
Heidi Kucera
David Kuck
R. J. Kuehn
Ray Kunde
David Kunstler
Michael Kuntzelman
Jeffrey J. Kurtzeman
Jack Kutz
Ron Kuykendall
Maurice and Elvira L'Italien
Debra Labrash
Don Lackner
Harold B. Lackner
John C. Lacy
Marvin and Carol Lagemann
Shannon Laird
C.S. Laman
Albert Lamarre
Dorothy C. Lamb
R.B. and L.C. Lambert
Richard Lamma
Rose Vaselak Land
Allen Landenslayer
Mr. and Mrs. James Landon
Joseph J. Lane
Mr. and Mrs. Arnold Lane
Marilyn Lane
Thoron Lane
Lane Brothers
Virgie L. Lang
Harry B. Lange
Margie Lange
Robin Lange
Bob Langsenkemp
R.J. and C.B. Lansky
Helen Laphan
Richard Lari

E. Larson
Harry Larson
Lynn Larson
Phyllis Larson
Tilford and Mary Larson
Jack Lasher
Ken Laue
Curby H. Laurence
Ellen Lauver
Paul Laux
Toby and Mary Lavetter
Harding Lawrence
Clyde Lawson
Tracy Lawson
Glen Layton
Ross Layton
Tracy Layton
Elizabeth Lazarevich
David W. Lazaroff
Albert H. Leaf
Margaret Leamer
Javier Ledesmer
Adele Ledford
Dess Lee
Ernest Lee
Mr. and Mrs. Lee
Bob Lefevre
Atta Leffingwill
Charles Lehan
Mr. and Mrs. Harold Lehan
Mari Leinberge
B.H. and B.J. Lemarr
Bill and Carol Lemun
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Phillip Lendon
Charles Lennon
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John Leonard
Iris Leonardson
Hazel Leonburger
Clarence Leone
Dorothy Leonoff
Karen and Wayne Leopold
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E. Nick Lepore
Jay Lerner
Frank Leslie
Ophelia Lester
Mary Levardo
William and Stella Levenson
Daniel Levi
M.D. Levin
J. Levy
Clyde Lewis
James Lewis
Malin Lewis
Mary Ellen Lewis
Joaquin Leyba
Ruben Leyva
Fred Liddle
Kathryn L. Lilly
R. Lindsay Lilly, Jr.
Marian Lim
Diane Lindahl
Linda L. Lindemann

Other Individuals, Organizations, Associations and Businesses: (Continued)

Jack Lindsey
Mary Nelson Lindsey
Diane Link
Joanne A. Linnemann
Hardin and Jane Littell
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Harold Livingston
Donald Livingstone
Alan and Jan Lizarraras
Kirby and Peggy Lockard
Mrs. Ruth Lockrae
G. Robert Lofgren
James and Margaret Loghry
Lilia Lohman
Clark and Eleanor Lohr
Dottie Loney
Ross and Shirley Loney
Homer H. Long
Leon De Long
Louis Long
Mrs. Fred Longstreth
Edward Lonsdale
Linda R. Loote
Ana and Jose Lopez
Jose A. Lopez
Lorinda Lopez
Mario E. Lopez
R.C. Lopez
Robert Lopez
Simon Lopez
Arcelia Loreto
Irving Losee
Cheryl Loveday
Edward W. Lowdale
Arlene Lowe
J. David and Edith Lowell
Mr. and Mrs. J. David Lowell
Nellie Loy
Gracede Lucas
Jesus Lucas
Ike W. Luce
Marilyn Ludwig
Gordon and Janice Luepke
Annette Luna
Gloria Luna
Margaret Luna
Mrs. Arnold Luna
Randall Lunday
Karl Lundberg
Walter Lundquist
Jean Lusk
Susan Lutch
Orville Lutes
W. and M. Lutes
David Lutz
Ralph Lydu
Jim and Linda Lynch
Rosanne Lynch
Mr. and Mrs. Lowman Lyon
William Lyon
Cynthia Maccri
Laura Mace
Harry and Theresa Macey
John Machac
Francis Macias
Mr. and Mrs. Mahlon Mackenzie
R. and E. Mackenzie
Lance Macvittie
Jesse Maddox
Bobbie Mader
Sheldon Madsen
Olive Maecher
Hagui Maghrabi
L. Magill
Reita Magill
John Magoffin
Timothy Mahlary
Sherman Maimreo
Manuel Majalca
Cheryl Major
Ronald D. Majors
Julius Makley
John and Sidney Malangs
Brenda Maley
Richard Mallig
H. V. Malloms
William Mallory
Ralph A. Malone
Leslie Maloy
Mr. and Mrs. Hector Manciet
Janet Mandrell
Howard C. Mangum
John Mangum
J.D. Mankowski
Geoffrey Manley
Barbara Manly
Susan Manning
C.J. Manolakis
Juliette Mansfield
James Mansharot
Carol Maples
Benny Mara
Jim Marcell
Mary Marchant
Joseph and Diana Marcinkowski
Joseph and Lynette Marco
Douglas Marcoux
Bill Marden
Lois and Steve Marecek
Dorothy Margolin
Rinaldo Mariscal
Ernie Hall Mark
Jack and Lorna Marks
John T. Marks
Dianne Marozas
E. C. Marques
Lorenzo Marquez
Octavio Marquez
John G. Marr
F. A. Marriante
Mr. and Mrs. Billie Marshall
Charles Marte
Jack and Paula Marteny
Albert Martin
Bob Martin
C. and L. Martin
Francis Martin
George Martin
George and Sheri Martin

Other Individuals, Organizations, Associations and Businesses: (Continued)

Harry H. Martin
Susan Martin
Thomas Martin
Vicki Martin
Phil J. Martin, Jr.
Linden Martineau
Carolyn Martinez
Jessie Martinez
Karen Martinez
Mary K. Martinez
Michael J. Martinez
Wanda Marts
Victor M. Marty
Mr. and Mrs. Andrew Marum
Mr. and Mrs. William Masland
Donald Mason
J. W. Mason
Pam and Ted Mason
Randall Mason
James and Karin Mather
Tom Matheson
John Mathews
Warren Mathews
Anna Mathias
Margaret Mathieu
Peter Mathieu
Howard Matin
Mr. and Mrs. John Matteson
Richard Mattice
Ann Mattingly
Richard Matts
Mr. and Mrs. Roy Mattson
Walter Maust
Alfred J. Mauzy
Elizabeth Mauzy
Judith Maximon
Gregory and Linda Maxon
Viola Maxwell
Andy May
Leslie May
Everett and Edna Mayer
Barrie Mayes
O. T. and O. L. Mayfield
Jeffrey S. Mayhew
Charles Maynard
Lloyd Maynard
Betty Mayo
Mayor of Sierra Vista
C. B. Mayoras
Mary Maza
Diane Manzanek
Mike Mazoyen
Megan McAndrew
Nancy McAvary
C. E. and J. B. McBride
Cheryl McBride
Gayle McBride
Homer McBride
Mike McBride
Pamela N. McBride
Steve McBride
Ted McBride
J. D. and Marianne McCain
Florence McCann
Brian McCarthy

Beth McCastand
Charles McCauley
Urania C. McClain
Mike McClanahan
Robert McClard
Ralph and Lois McClellan
Frances McClelland
Scott McCleve
Mr. and Mrs. Frank McClure
Lamont McConnell
Daniel McCool
Dr. Clarence McCoy, Jr.
Patricia McCrady
J. P. and Kathryn McCraren
R. B. McCullough
E. J. McCullough, Jr.
Alice McDaniel
Dale McDaniel
Billy McDavid
Fred McDonald
Rex McDonald
N. W. McDonough
Deylan McDowell
John S. McEldowney
Ronald C. McEuen
Terry McEuen
Ruth McFall
Mr. and Mrs. Anthony McFarland
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Lawrence L. McGee
Robert and Theresa McGhee
Earl McGill
Ronita McGill
W. S. McGinnis
Nellie M. McGintry
H. L. and L. J. McGoffin
Clyde McGoldrick
E. K. McGovern
Rev. M. McGovern
Patrick McGowan
Tammy McGreevy
Isabel McGregor
Mary E. McGuire
Dorothy McIlroy
Evelyn J. McIntyre
L. and P. McIntyre
Marc McIntyre
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Bruce McKeller
H. McKellid
Jill C. McKennis
Andy McKenzie
T. K. McKenzie
Sharon McKillip
John McKinney
Mrs. William McKinney
Tina McLain
Mary McLaughlin
Kelly McLear
Phillip L. McLendon
C. McMackin
Dr. William McMahon
Joan McMahon
Michael McMahon
Peter McMain

Other Individuals, Organizations, Associations and Businesses: (Continued)

Scott McMillen
Dr. Charles McMoran
Claude and Jessie McNair
Theresa McNally
Chris McNeave
Joan McNitt
Lisa McNutt
Joanne E. McPhelin
G. and M. McQueen
Harry A. Mead
John S. Meadows
Dennis F. Means
S. M. Mecoechea
Beverly Medina
Jerry Medince
Louise Meenach
Mr. and Mrs. Paul Megna
Tom Mehlert
Delbert Mehrleys
John Meiks
Barbara Melay
Susie Melay
Walter Mellberg
Harry Melts
Robert Melzer
Armando Mendez
Segio and Aline Mendez
David Mendoza
Scott Meneely
J. A. and V. E. Mercer
Mr. Mercer
Jerome Mercker
Mr. and Mrs. William Merodias
Mr. and Mrs. Benson Meservey
Elaine Metz
Robert and Sarah Metz
Teresa Metzger
Alice Meyer
L. W. Meyer
Roy and Geraldine Meyer
Daniel and Sydney Meyers
Jill Michael
Ron and Robin Michalak
Carolyn Michel
Edward Mick
A. M. Mickelsen
George Middendorf
Mr. and Mrs. Michael Middleton
Evelyn Mike
Arthur Milczarek
Robert Miles
Ann Miller
Barbara Miller
Brita Miller
Francine E. Miller
Larry Miller
Mr. and Mrs. Dayton Miller
Richard Miller
Robert Miller
Susan Miller
Clayton K. Miller, III
John Millican
Bert Mills
Bert W. Mills
Doloris Mills
Smith and Mary Kay Minarik
Jenne Miner
Eugene Mingus
C. O. Minichley
Joe Minici
Rosemary Minter
R. and E. Misiorowski
Brett Mitchell
J. R. Mitchell
Marcus Mitchell
Pauline Mitchell
Ray Mitchell
Paul K. Moffat
Charles and Sarah Moffett
Jim Moffett
Christine Mojzesz
Freddy Molina
R. G. Molina
Susan Molina
Artemisa Molivia
Michael Monahan
Cheri Monroe
Mike Monroe
David Montague
Christina Montano
Jose Montano
Martha Montevallo
George Montgomery
Robert E. Montgomery, M.D.
J. and P. Montierth
George and Francis Mooberry, Jr.
Richard and Maxine Moody
Hazel M. Moore
J. J. and D. C. Moore
Kenneth Moore
Maj. Gen. Cecil Moore
Mrs. Ruby Moore
Robert A. Moore
L. E. Moore, Jr., Pres.
Arnold Moorhouse
Johnny Mora
Toni Mora
Beatrice Morales
E. and Y. Morales
Eduardo Morales
Mike Morales
Mr. Morales
Sara Morales
Shirley Morales
Rupert G. Morales, Jr.
Susan Moran
Bonnie Morehouse
Kathy Morell
Evangelina Moreno
H.M. Moreno
Robert A. Moreno
Barry Morenz
R. Morew
Beth Morgan
George W. Morgan
James Morgan
Joyce and Glen Morgan
Michael Morgan
David Moriarty
E.E. and G. Morril

Other Individuals, Organizations, Associations and Businesses: (Continued)

Blair Anna Morris
Douglas Morris
Kay Morris
Larry Morris
Mr. and Mrs. Roger Morris
Dr. Roger Morrison
Robert and Jeanne Morrison
R. W. Morrow
Robert J. Morse
William Morse
Scott Mortensen
Howard Morton
G. Mose
R. Wayne Mosier
Byrd Moss
Robert Moss
Terry Moss
Wm. and F. Mott
A. B. Mountjoy
Donna Movis
Dr. Tommy Mullenaux
Martin Muma
Bruce Munda
Jim Munday
Eduardo Muniz
E. Munoz
Jose Munoz
Joseph C. Murawski, Jr.
Thomas and Alice Murch
R. and B. Murdock
Mr. and Mrs. Robert Murphey
Norma Murray
Priscilla Murray
Robert H. Murray
Emily Murrey
Norma Musar
Consuelo A. Musiaz
Sheri Musil
Mr. and Mrs. James Musser
Mr. and Mrs. Alfred F. Myer
Dawn Myers
Kerry Myers
Margaret Myers
Michael Myers
Barbara Nachbaur
Steve Natali
Johnny C. Nater
Tom Natkin
L.M. and D.A. Nauman
Rigoberto Nava
Gordon Neal
Mrs. Saralie Neal
Kathryn Neary
Al Necos
John Necos
Trudy Neff
Biff Nelson
Dorothy Nelson
Edna Nelson
Gale and Yvonne Nelson
Gary and Dorothy Nelson
George Nelson
Lois Nelson
Marilyn Nelson
Michael Nelson
Rhonda Nelson
William and Dianne Nelson
Ruth Neppel
Mike Newcomer
Ruth Newcomer
Diana Newell
Jo Ann Newland
Beth Newman
Betty Newman
Dolores G. Newman
Mary Newman
Star Newman
W. J. Newman
Mr. and Mrs. Gordon Newman, Jr.
Charles K. Nichols
Mr. and Mrs. Guerdon Nichols
R. B. Nichols
Carren Nicklas
Dan Nicolini
Charles Nielsen
John Nigorski
Robert and Nelle Noble
A.F. Noland, Jr.
Earl Noland
Fred and Zella Noon
Robert Norse
Susan North
Edward Norvaisis
Helen Novack
Barbara Novak
Nick Novasic
Alis Novoa
Nan Nye
James O'Brien
May O'Byrne
Bob O'Connor
Edna O'Dowd
Barbara O'Hagin
Keith O'Malley
Erin O'Neal
John O'Neal
Patrick O'Neal
Doris M. Oakes
Doris Obery
Jeffrey Ochs
J.T. Odneal
Herbert R. Oelsahlegel
Patsy L. Ofenlock
Everett and Betty Ogden
Phil Ogdon
Patty E. Oge
Robert Ohanian
Lee Oler
James and Carol Oley
Edith Oliak
Marjory Ollson
Jim and Susan E. Olmstead
Kathy Olmstead
Laverne Olney
T. D. and F. R. Olsen
Mr. and Mrs. John Olson
John K. Olsson
Tina Oman
David Omehi
Francis Orana

Other Individuals, Organizations, Associations and Businesses: (Continued)

James Orlebeke
Debra Ormberg
Mrs. Marie Ornelas
Ron Orozco
Ruben Orozco
Cecelia and Mr. Ortega
D. and G. Ortega
Irene I. Ortega
Michael Ortega
Shirley D. Ortega
Belinda Ortiz
Mammel V. Ortiz
Amelia Orzate
Paul Osborn
Martin J. Osborne
N. Ossanna
Eric Oswald
Mr. and Mrs. Charles Ott
William F. Ott
Debbie Ouellette
Jamie Overfeeld
Rose Mary Owen
Abie Owenes
Kathy Oyler
Clyde Pace
G. Packard
Ralph C. Padilla
Marvin Paffenroth
Robert Pague
Janice Palma
Carl Palmer
David Palmer
Grace Palmer
Eileen Panowski
Hiram Parent
Cindie Park
Edwin P. Park
Connie Parker
Debra Sue Parker
George Parker
Max Parker
Brian Parks
Lorena Parra
Dale Parris
Mr. and Mrs. Bruce Parsil
John D. Parsons
Peter Patch
Wally Paton
Mr. and Mrs. William Patterson
Barney Patton
Dennis and Pamela Patton
Sr. Mary Paul
Deb Paulhin
Jane Paulson
Steve Pawn
Gary Payne
Hope Peale
Beth Pearson
Mary Peazzi
Lavon Peck
Leona Peck
R. and R. Peck/Hibbard
Cara and Karen Pedersen
Robin Peewy
H. W. and Maxine Peirce
Michael Pender
George Pendleton
Timothy K. Penik
Virginia Pennel
Deefomp C. Perez
Ferne Perez
Irene Perez
Norma M. Periz
Mr. and Mrs. Charles Perkins
Herschel Perrin
Pamela Perry
R. A. Perry
V. and S. Perry
Mrs. Parker Perry, Jr.
E. T. Person
Charles Persons
George Pestell
C. K. Peters
Miriam Peters
Robert Petersen
Audry Peterson
Betty Peterson
Lori Peterson
Mr. and Mrs. Dean Peterson
Mary Peterson
Robert and Nina Peterson
Roger S. Peterson
Rudy Petracci
Karin Petrie
Clarence Petty
Francis A. Petty
Doug Pfeifer
Ed Pfeifer
Cliff Pfeil
Roger Pfeuffer
Nancy Pfieffer
Ana Phagan
Thomas Phagan
Sister Ann Philip
David Phillips
Mr. and Mrs. J. E. Phillips
Jean Piatt
J. L. and D. Picard
Geno Picchioni
G. W. Pickard
Shirley Pico
Annette Picone
Steven H. Pielstick
Thorne Pierce
Trudy Pierce
Frank Pierson
Barry Pillica
Cindy L. Pillowski
Pascuala Pineda
Isauro Pinedo
Earl Pingry
John F. Pintek
Terry and Clara Pinyerd
Jay H. Platt
Steve and Marty Plevel
Mr. and Mrs. Plyler
Margery Plymire
Lee Poague
Martin Pokorny
Dan Pollak

Other Individuals, Organizations, Associations and Businesses: (Continued)

Robert Pollard
Brigio Pollock
Robert and Jane Pollock
Rev. Charles Polzer
Mr. and Mrs. John Pond
Louie Pope
Susan Pope
Louis Pope, Sr.
A. O. Porter
Dr. Doran Porter
Terry Posedly
Mary H. Poster
Dr. William Poston
Jane Poston
Robert Potts
Dennis and Jeanne Powell
Elizabeth Powell
Paul Powell
Ralph Powell
Mr. and Mrs. Donald Poyas
Elsie Prall
Jerry Pratt
Prior Pray
Dr. and Mrs. Frank Preston
Jacquelyn Preston
George Price
Lela Prickett
Eva Prince
Jan Pringle
Mike Proctor
T. W. Proffitt
Roy Profitt
Albert J. Puazzi
Calvin Puckett
Jody M. Pugh
Carl F. Pugliese
George and Eleanor Pugnea
Dr. Charles Pullen
Dru Pulliam
Abbie and Gary Pundt
Thomas and Jessica Purpus
Norma and John Pursley
Andrea J. Puryea
Charles Putnam
Mary Puzzi
William F. Pyburn
James Pyeatt
J. R. Pyers
Ross and Maria Quigley
Donna Quillen
Herman Quiroga
Rosalie Rabago
W. J. Rador
Gerald and Marcia Page
Charles Ramirez
F. Ramirez
Katalina L. Ramirez
Ramiro D. Ramirez
Elizabeth Ramsell
Ralph C. Ramsey, Jr.
Al D. Rand
Wayne Randall
Mrs. Jean Raper
Ronald Rapp
Clark Rasche
A. G. Rascon
Clarence Ratcliff
Mr. and Mrs. Robert Ratcliffe
Deborah Rath
Mr. and Mrs. Jogeswar Rath
Charles Rau
Pete Rauden
Robert and Pat Rauh
Evert Raulston
Kenneth Ray
Sommi Raymond
Mary Ellen Razda
Helen Reagan
Juel Reardon
Peyton Reavis
Charles Reddan
Pauline Redding
Jack and Diane Redhair
Cristobal E. Redondo
Harry Reece
Donna Reed
George Reed
Jayne Reed
Paul and Myra Rees, Jr.
Paul Reese
Donald Reeve
Gilbert Reeves
Martin Reff
Thomas and Joyce Rehm
Rev. William Reid
John Reidinger
Dennis and Janet Reidy
J.V. Reidy
Phyllis and Bill Remington
H. and L.A. Reneer
David Renhold
Dianna Repp
Olin and Ruth Ressler
John Revak
Ignacio Reyes
Margaret Reyes
Pablo Reyes
John Reyna
Steve Reynolds
Judy Reynoso
Margaret Rhoads
Christine Rhodes
Danna Rhodes
Dusty Rhodes
Jack Riback, Pres.
Clara Rice
Goldie E. Rice
Lee Rice
Margaret Rice
Mrs. Raymond Rich
Elizabeth R.S. Richards
Gertrude Richards
James Richards
Larry Richards
Buddy Richins
Carla Richins
Lillian Richins
Russell Richins
J. L. and M. S. Richmond
Sharon Richmond

Other Individuals, Organizations, Associations and Businesses: (Continued)

Donna and Robert Rickerby/Harlow
Joan Ridder
A. T. and M. J. Ridgeway
Ruby Rievisthal
Ronald M. Rife
Arthur and Leona Riggs
Carol Riggs
Ellerbe Riggs
Frank and Gail Riggs
Norma Lea and Jim Riggs
William Riggs, Jr.
Bill Riley
Frank Riley
James L. Riley
Margot Riley
Bill Rimble
Allen and Margie Ringnell
James Rios
Ruben Rios
William Risner
P. O. Rittenhouse
R. R. Ritter
Howard Riuh
Ana Maria Rivera
Larry Rivers
Ramon Rizk
Mel Roach
H. L. Robb
Barbara Robbins
K. Robbins
Lawrence Robbins
Peter Robbins
Brand Roberts
Charles Roberts
Charles Roberts
Mark Roberts
Sarah Roberts
Anna Robertson
B. Robertson
J. and C. Robertson
Ken Robey
A.C. Robinson
Barbara Payne Robinson
Elaine Robinson
James and Marjorie Robinson
Lori Robinson
Marilyn Robinson
Agnes and Alfonso Robles
Esther Robles
George and Joan Robles
Amonda Rodriguez
John Rodriguez
Julian Rodriguez
L.G. Rodriguez
Mrs. Norma Rodriguez
Ralph Rodriguez
Robert Rodriguez
Sally Rodriguez
Susie Rodriguez
Victor and Elvia Rodriguez
Ruben and Hermenea Rodriquez
Alice Roe
G. Roe
William Roe
Carolyn Roederer
Robert B. Roemer
Joe Roger
E. A. Rogers
Georgianna F. Rogers
Jesse Rogers
Pat Rogers
L. A. and G. T. Rogge
Charles Rogle
Jerry Roihe
Angie Roinson
Victor Rojar
Karen Rojas
Rosa Rojas
Richard Rolles
Judith Roman
Mamal D. Romeo
Alex Romero
Brad Romero
F.A. Romero
Frank Romero
Frank and Ana Romer
Hector Romero
I. and B. Romero
Mario F. Romero
T. Romero
Thomas Romero
Daryl Romeyn
Heidi Ron
Alfred F. Ronstadt
Dale Rooney
Edward Roos
Mr. Root
Becky Roqueni
Eave and Jaime Roqueni
Francisco Roqueni
Manuel Rosado
Carlos Rosales
E. C. Rosales
Frank Rosales
Mr. and Mrs. Marlin Rose
Mrs. Mariam Rose
Sally L. Rose
Victor Rose, Jr.
Mr. and Mrs. William Rosecrans
E. Lee Rosenthal
A. D. and V. J. Ross
Arthur H. Ross
Ed Ross
Edward Ross
Debra Rothpeetz
Ernest Rothpletz
Mr. and Mrs. Robert Rothrock
Stowell Rounds
Kirrilla and Eddie Rouse/Lackner
Helen Rout
Guy Rovelh
Thelma Rowe
Roger Rowland
Frank and Frances Royball
Sam Rua
Mairo Ruez
Mr. and Mrs. O.W. Rugg
Ana Maria Ruiz
Mathew Ruiz
John Rulmys

Other Individuals, Organizations, Associations and Businesses: (Continued)

Jack and Carmen Rumps
James and Ruthena Rusk
Margaret Rusk
Bruce Russell
Christa A. Russell
David Russell
Dr. F. E. Russell
Jo Ann Russell
John Russell
Judy Russell
Mark Russell
A. Ryan
Billie Jo Ryan
James Ryan
Pat Ryan
Sarah L. Ryan
Ronald Rye
Fred J. Ryff
Leslie A. Rylander
Mary Saad
Anna Saavedra
Mr. Jean Saba
Eleli Sabatie
Rose Marie Sacco
Delais A. Sahan
Reynaldo Salazae
E.A. Salcid
Manuel and Mary Salcido
Amelia Saldivar
Marcella Salem
Nerhayati Salleh
Eliseo E. Salmon
Mr. and Mrs. Joseph Salmon
Pete Salmon
Richard Saltford
Bill Salzbrenner
Mrs. H.H. Salzbrenner
Sherri Samienego
Gilbert Sammels
Diane J. Sander
John Sanders
William W. Sanders
W. W. Sanders, R.F.D.
W. Joss Sanderson
Luis Santaella
Ramona Santamaria
Rhea Ann Santay
Garbis Sariyan
John Sarna
Louise Sattenspel
Evelyn and Blyte Saunders
Jim Saunders
Kyle Sawyer
Phil Sawyer
Delores Saxon
Jim L. Scarborough
Joe Scarpignato
Kay Scarpignots
Dr. and Mrs. John Schaefer
Marnie Schaefer
Enos Schaffer
Mr. and Mrs. John Schannep
Charles B. Schaughency
S. Leonard Scheff
F. G. Scheider
William Scheindar
Mike Schern
S. B. Schiel
L. L. Schier
John Schipfer
Caren Schiro
Bill Schisler
Mr. and Mrs. Herman Schisler
Suzanne Schlegel
Mary Schlentz
Gay Schmiddin
Lothar Schmidt
Donald Schmoldt
Ron and Irene Schmoller
Ervin and Velda Schmutz
Larry Schneider
Richard Schofield
Robert Scholes
Bill Scholz
Marilyn A. Schoof
Dr. John Schorsch
Mr. Schrader
Delbert Schranks
Mr. and Mrs. C.B. Schrayberrey
Mary E. Schreiber
Jim Schreiner
Norma J. Schroeder
Vonnie Schultz
Mrs. F.W. Schupp
Gerald Schuster
Lorel Schwam
Maynard Schwegert
Debra Scott
John Scott
Kenneth Scott
Mary Lou Scott
Rhea Scott
Rosemary Scott
Thomas Scott
Yvette Scott
Joan Seaney
Cabot Sedgwick
Mark Segal
Nellie Segonia
Seibold Ranch
Fred and Kay Selby
Howard and Liliane Selby
Patricia Selchow
James Sell
Eleanor Sellers
Mr. and Mrs Bob Selman
Owen W. Selvian
Bonnie Sempler
Alfonso Serrano
Bunny Serrano
Donald Sessions
Martha Sessono
James Setchou
Florence Settle
Lydia Seyanio
Grace Shafer
Doug Shakel
Mark Shamo
Pat Shannon
Norman and Louise Shapiro

Other Individuals, Organizations, Associations and Businesses: (Continued)

E. M. and F. W. Sharpe, Jr.
Patsy Sharpton
Warren and Wendy Shaul
John Shaver
Claudia Shaw
Richard Shaw
Mary L. Shay
Maureen Sheehan
Joe Sheehey
Karin and Jeff Shelton
Robert Shelton
William C. Shepherd
Wade Sherbrooke
Ray Sherrill
Betty Shield
Joe Shilds
Jacqueline Shields, PHD
Arvin and Arva Shiflet
Myrna Shilling
Melvin Shinabargar
Charles and Bonnie Shipman
Robert Shively
David Sholes
Mr. and Mrs. Mark Shomo
Vaughn Short
Bonnie G, Shoun
Allen Showalter
Cal Shultz
Gail Shultz
Conrad Siddons
R. C. and G. R. Sieber
Ralph Siedel
Isreal Siegel
Ruth Sigler
Herbert Sigrist
Richard Sihiffilive
Thomas Siltala
Santiago Silva
Lorinda Silver
Dennis Silvola
Becky Simmons
Joel Simmons
Keith and Linda Simmons
Jeffrey Simms
Bruce Simnacher
Philip Simon
Karin Simons
Bonnie Simpler
Michelle L. Simpler
Beatrice Sims
Cal Simsich
M. Simsons
Harold Sinclair
Mr. and Mrs. Steven Singer
Edward Singley
Larry and Carol Sipe
D. and D. Sison
Greg Sisung
Richard Shanks
Harold Skinner
Harold and Nora Skinner
Louis Skinner
Mr. and Mrs. Peter Skipper
Susan Skirvin
Stanly Sleeman
Edward Sleger
P. H. Sloan
Paul Sloan
Alan P. Sloan, Sr.
Thomas H. Slone
Tom Slone
Virginia Slover
G. Slug
Judith Smalligan
T. C. Smallwood
Daniel Smiley
Branson Smith
Clifford Smith
David Smith
Fay Smith
Fay Smith
George Smith
H. L. Smith
Harry C. Smith
Ike Smith
J. J. Smith
Janel Smith
Jillyn Smith
John and Cathy Smith
Jon F. Smith
Joyce Smith
Kimberly Smith
Linda Smith
Mr. and Mrs. Kenneth Smith
Minna Smith
Patricia Smith
Paul M. Smith
Phillip Smith
Randall W. Smith
Ray and Pauline Smith
Reginald Smith
Richard Smith
Robert T. Smith
Sally Smith
Sara Smith
Steve Smith
Vera and Eldon Smith
April Smith Hiller
Janet Smith-Ampa
Margaret Smithe
Melvyn O. Smoot
Mary Snider
Rhonda E. Snider
Frank Snow
Ben Snure, Jr.
Dr. Noel and Helen Snyder
Earl Snyder
Greg and Jody Snyder
Harry R. Snyder
Helen Snyder
Noel and Helen Snyder
John Sofias
G. and J. Sokovich
Soldier Camp PTE
Mr. and Mrs. Donald Soles
Peggy Son
Carol Sonnichsen
Aple J. Sorich
Sister M. Sorich
Raul Sorrano

Other Individuals, Organizations, Associations and Businesses: (Continued)

Steve Sorteomme
Maria E. Sosa
Yolanda B. Soto
Seth and Cynthis Southard
Lyle K. Sowls
Clyde Sparks
Leonard Spatela
Mr. and Mrs. Harry Spear
Lynette and Ted Specker
Ken Spedding
Howard Speigel
Walter B. Spence
Frank Spencer
Sharon and Larry Spencer
Mr. G. A. Spikes
Louise B. Spiles
George Spofford
Michael Springs
J. M. Squibb
Leonard Staff
John Stair
Richard W. Stallcup
Pat Stallings
Jerry Standley
Miki Stanfield
Cleo J. Stanford
Stanley/Hays
Jack Staples
Robert B. Staplest
John Stark
Eileen Starr
James and June Stavem
Betsy Steele
Loralee Steele
Russell and Billie Steinback
Dorothy A. Stephenson
Lawrence and Gail Stern
Dr. A. L. Sterns
Patti Stevens
Walter Stevens, Jr.
Bayard and Jewell Stevenson
Nancy Stevenson
Bette J. Stewart
Bud Stewart
Jean Stewart
Mrs. Andrew J. Stewart
Ronald Stewart
Terri Stewart
Jim Stichand
W. E. Stidhaur
Edward and Lori Stiles
Maryan Stioham
Marie Stites
Doris Stochner
Sharman Stockton
Barbara Stockwell
Mary Stoichner
Durght Stoley
Martha Stolp
Stewart Stolzemann
John Stompoly
Cindy Stone
Mabel Stone
Jane Storie
Brick P. Storts, III

Mrs. Maude Stowe
Emily V. Stowell
Galen James Stowell
Mr. and Mrs. Donald Strand
Mary Strasser Butler
R. B. Strath
Allan and Shirley Stratman
Dr. R. B. Streets
Nancy Strickland
Jerry Strickling
R. Ed and Kathleen Strittmatter
James L. Stroud
Bob Stuart
James and Janice Styn/Beltron
Alfredo Suarez
Shumway Suffel
Cathi and James B. Sullivan
Dan Sullivan
Paul B. Sullivan
Charles R. Sumner
Dale Surprise
J. A. and M. G. Sutton
E. K. and M. L. Swanson
Mr. and Mrs. Sigfried Swanson
Tom Swanson
Frances Swarthout
Gerald and Ruth Sweeney
Mrs. Joan Swetland
Everett Swick
Harold Swyers
Arthur and Anna Sylvester
Carnell Sysis
Gary Szczepanski
Frank Szehner
Fred and Laura Tabacchi
Louis Taber
Eleanore Taff
Nancy Tahey
William and Jenny Talcott
A. and J. E. Talley
Jackie Talley
Angeline Tally
Tony M. Tamburo
Alfredo Tapia
Frank Tapia
Mrs. Mercedes Tapia
Frank and Beverly Tapp
Linda Tarantal
Chris Tardif
Allene Taylor
Becky Taylor
Farr Taylor
Grace Taylor
James M. Taylor
Krystal and Vernon Taylor
Larry Taylor
Lawrence Taylor
Leonard Taylor
Mr. and Mrs. Floyd Taylor
Mary Taylor
R. V. and N. E. Taylor
Richard Taylor
Robert Taylor
William R. Taylor
John Teet

Other Individuals, Organizations, Associations and Businesses: (Continued)

Carrie Telford
Walter L. Teller
Fred Tepier
Ray Terry
S. and B. Terry
Margaret Theisen
James and Joan Thelander
John D. Themar
Lorraine Thiboult
Kathleen Thiel
Ray Thiessen
Bill Thomas
David Thomas
G.L. Thomas
Gary Thomas
J.T. and J. Thomas
James Thomas
Mr. and Mrs. Donald Thomas
Ollie H. Thomas
Randy Thomas
Sister M. Thomas
Tom E. Thomas
Virginia Thomas
Virginia Thomas
Yvonne Thomas
R.L. Thomasson
Arthur Thompson
Charles Thompson
Fred Thompson
Gloria Thompson
H. and M. Thompson
Herbert Thompson
Louis Thompson
M.E. and M.E. Thompson
Max Thornburgh
Debra A. Thornby
Burl Thornton
Charles Thornton
Leona Thrive
George Throp
Harold Thurbur
Cheryle Thurman
Doris Tidmore
Dr. James Tilley
Mr. and Mrs. Thomas Tinervan
Thomas and Lola Tinervin
Jack Toenjis
Joshua and Joyce Tofield/Percher
Keith Toland
Marvin Tollett
G.I. and A.N. Tolman
H.E. and W.S. Tolman
Bradley Tolson
Isabel Toombs
Mr. and Mrs. Jim Tout
Stewart W. Towle
Charles L. Townsdin, Jr.
J. Toy
Christopher Trask
Ann Trauscht
Rau Travers
Kelly Treiler
Raymond Trestrail
Bill Treumann
Merle and Judith Triplett
Ted Troller, III
Frank L. Trujillo
Loraine Trunkett
Roy D. Trust
Bertha Truttmann
R. C. Tuller
Kathy and Jim Tully
Marie Tuxhorn
Paul Tynan
Laura Uhrik
William Uhrik
University of Arizona
Charles Urban
Joseph Urban
Gworge Urquinez
Myra K. Vaag
Jim Vaaler
Mama Vaguijo
Eddie Valdez
John Valdez
Marc Valdez
Hermelinda Valencia
Paul Valenjuela
Manuel Valensprele
Bill Valenzuela
J. R. Valenzuela
Victor M. Valenzuela
Joan Van Delos
Paul and Bonnie Van Der Hulst
Mr. D.W. Van Der Zel
Maj. R.S. Van Diver
R. Van Gordor
M. Van Landingham
Mr. and Mrs. Anthony Van Marle
Willard R. Van Nostrand
D. D. Van Soelen
Cliff Vance
John Vancza
Sue and Hoyt Vandenberg, Jr.
Gloria E. Varela
Diana Vargas
Julian Q. Vargas
Jack and Stepahnie Varon
Mari Vasquez
Mike Vasquez
Pete Vasquez
Renee Vasquez
Tony Vasquez
Martha Vaughan
James and Vivian Vaughn
Albert Vaul
Albert Vawter
David Vega
David M. Vega
Rafael Velasco
Fred Velasquez
Charles Ventres, Jr.
E. and M. E. Verbout
I. Edward and Nita Vergara
Ken Vernick
Lily May Vester
Garven Videen
Catherine Viggars Reinbold
Cpt. and Mrs. T. Vigil
Lillian Vigil

Other Individuals, Organizations, Associations and Businesses: (Continued)

Sandy Villa
Diane Villegas
Mrs. Villicana
Gabe Vincent
Tom Vincent
Mr. Vinerz
A. and A. Visco
Henry M. Visick
Mrs. G. P. Vlassi
Edwina Vogan
J. C. and O. B. Von Bloecker
Johannes Von Trapp
R. W. and D. M. Von Werne
Barbara Boriea
Mary Vosberg
Lee Vought
John Vraister
Steve Vukcevich
Richard Wachter
P. and R. Wacker
Wm A. Waddick
E. J. Waechter
Ernest F. Waechter
Marion Waesch
Dr. J. A. Wagner
Maxine Wagner
Norbert Wagner
David Wahl
John Wahlmeier
Stewart Waight
Anna Wainger
John Waite
Ann Walka
James Walker
James Walker
Luke Walker
Wally Walker
Wm. and Elizabeth Walker
Wookwille Walker
Ruth Wallace
George Walrabenstein
John Walsh
Sidney Walter
Marlene Mary Walters
Mr. and Mrs. Charles Warburton
Brian Ward
Robert Ward
Sherla Ward
Mr. and Mrs. Jim Wardle
Diana and Winston Warr
W. A. and M. Warskow
John Wasley
Healing Waters
Terry Waters
William and Julie Waters
Arleigh Watkins
Bob Watkins
Evelyn M. Watson
H. and M. Watson
James Watson
Mr. and Mrs. Richard Watson
Minnie Watson
Bill Watt
Lola Watts
Donald Way

W. D. and Peggy W. Wear, Jr.
John and Mary Weaver
Barbara E. Weber
Frank Weber
Mrs. Frank Weber
Iris Webster
Jillene Webster
Jane and Lawrence Webster/Scott
Allen Weech
Dale and Brenda Weech
Thomas Weeks
Larry Wegeman
Joyce Wegesser
Juliane Weige
Ed Weinkanf
Ru Weinman
Cliff Weinstein
Mr. and Mrs. Phillip Weinstein
John Weisheit
Gordon and Vickey Weiss
K. R. Weissenborn
F. H. Weissner
Stanley and Arlyss Weitkamp
David Weitz
Bill Welch
Greg Welch
Roy Welch
Victor Welch
Louise B. Weller
Norma J. Welles
Steve Wellman
Frank Welsh
Harry Welsh
Edward J. Wentauf
Mr. and Mrs Floyd Werner
Ward C. Werpy
Jim Werstler
Roger and Jennifer West
John W. Westcott
Mr. and Mrs. Don Wester
Jacob Wetzel
Lewis Wetzel
N. P. and Joyce Whaley
Mr. and Mrs. W. J. Whatcott
Roger Wheaton
Paul Whelan
Ridgely and Hoyt Whitaker
Jesse and Betty White
Nelda White
Richard D. White
Robert Whitman
James and Ruth Whitmer
James B. Whitten
Cathy Wicker
Lynferd and Laura Wickerham
Helmer Wicks
Frank and Dorothy Wiggins
Jerry F. Wilbur, Jr.
Harriett Wiley
Inell Wiley
Mr. and Mrs. Joe Wilhoite
Jeffrey Wilkens
Mr. and Mrs. David Wilkinson
Mr. Will
James M. Willbourn

Other Individuals, Organizations, Associations and Businesses: (Continued)

James William
Betty Jo Williams
Clifford Williams
Clint Williams
Culina Williams
Dan Williams
Earline Williams
Elizabeth D. Williams
J. T. Williams
Lloyd Williams
Mickey Williams
Mrs. Kay Williams
Roy Williams
Rufus Williams
Ruth Williams
Stephen Williams
Ben F. Williams, Jr.
C. P. Williams, Jr.
Porter Williamson
Charles Willington
Joe and Maia Willington
C. C. Willis
C. W. Willis
Charles R. Willis
Clifford Willis
Mr. Wills
Hank Wiloe
Barbara Wilson
Bill Wilson
Charles Wilson
Gloria Wilson
Gregg Wilson
Helen and Barbara Wilson
Jamea and Violet Wilson
Richard Wilson
Rose Wilson
Shirley Wilson
Verlyni R. Wilson
Evelyn M. Wimmer
Doris and William Winkler
Mary Winkler
Ross Winter
Leslie Wirth
Linda Wirth
Kathleen Withay
Louise Witkowski
Suzanne Witkowski
Julie Witman
F.C. and Audrey Wittekamper
Mr. and Mrs. Harold Wold
Roger and Cheryl Wolf
Tom Wolf
Tom Wolfe
E. R. Wolfrom
David Wolfskehl
T. J. Wolner
Mort Womack
Donald Wood
Donald D. Wood
Donna Wood
William E. Wood
Baxter Woodman
Jane Woodruff
Kent Woods
Mr. and Mrs. Walter W. Woods
Ray and Helen Woods
William R. Woodward
Louis Woodworth
C. S. Wooldridge
Robert L. Wooldridge
W. Wooldridge
John Wooley
Gary Woolston
Ann Workman
Dorcas Worsley
Robert Wortman
Lorey Wray
Amy Wright
Foster Wright
H. Diane Wright
J. D. Wright
Jack Wright
James Wright
Michael and Tricia Wright
Tom Wright
Minturn T. Wright, III
Jeanette Wuneche
Mark Wyare
Susan Wyatt
Karen Wylie
Judith Yancer
Don Yankey
Monte Yent
Kathleen Yilary
John Yoakum
Shirley Yonsetto
Albert Young
Bob Young
Donald J. Young
Ed Young
Mr. and Mrs. Max Young
Marcia Young
Varia Young
Solomon Youngerman
Kay Yunt
J. Yurkerman
Lorenzo Zavala
Michael Zavala
Robert G. Zazueta
Abbie Zeltzer
Mr. and Mrs. Stephen Zene
Monte L. Zent
Tony Zepeda
T. A. Zienka
Dale and Marian Zimmerman
Dean Zimmerman
Robert T. Zimmerman
T. H. Zimmerman
Fred Zimmermann
Clyde and Maxine Zook
Horst and Maria Zuehlke
Mr. and Mrs. William Zuehlke
Betsy Zukowski
Dr. Malcolm Zwolinski

Other Individuals, Organizations, Associations and Businesses: (Continued)

Organizations

American Legion Auxiliary #66
Amphi Men's Club
Safari Club, AZ Chapter
Amphitheater PRG
Barbershop Quartet (Spebsqsa)
Anaconda Company Dir. Envir. Control
AZ Center for Law
Anam Inc.
Arivaca Minado
VFW Auxiliary 10,008
Assoc. Mgers Inc. American Institute
Black Oak Cemetry
Ben Avery AZ Outdoor Writer's
AZ Wilerness Coalition
AZ Association of 4/W
Boy Scouts of America (Tucson)
AZ Church Christ Camp
Willcox Volunteer Fire Department
AZ Department of Education
Sahuaro Heights Coalition
AZ Education Association
GPAA
AZ Historical Society
Road & Trail Association
AZ Mining Assocociation
Izak Walton League
AZ Power Authority
N.C.H.A. AZ Wildlife Federation
(Sierra Vista)
C.E.M.A.
Cablecom Gen Inc.
Canyon St Commission
Chamber of Commerce, Safford
Chamber of Commerce, Benson
Chamber of Commerce, Bisbee
Chamber of Commerce, Douglas
Chamber of Commerce, Sierra Vista
Chamber of Commerce, Tombstone
Chamber of Commerce, Willcox
Chamber of Commerce, Tucson
Chapter DAR (Tombstone)
Tucson Ctz Patic Ward 2
Cit. Forest Coalition
AZ Motorcycle Dealers
Comm. Outreach Deaf Program
Copper Country Mountaineers
AZ Wildlife Federation (Phoenix)
Sierra Club Legal Defense Fund
Amerind Foundation
Natural History Museum
Girl Scouts (Tucson)
E. Branch YWCA
Ecumenical Council
Douglas Education Association
Fairways Property Owners
El Dorado Town Homes
Elec & Bew Union
AZ Small Mine Operators
FAA (Los Angeles)
FAA DMA
Fairfield Green Valley, Inc.
AZ Public Service Co.
First Southern Baptist Church
Greenlee Graham SR
Forest Planning
Seago, 208 Water Qual MGM
NALC
Southern Pacific Comm.
Willcox-San Simon NRCD
Boy Scouts of Arizona (Douglas)
Western Forest Ind. Assn.
Gen. Comm. Service
Rotary Club (Willcox)
S. AZ Wildlife Callers
AZ Conservation Council
Mounted Assistance Unit (Tucson)
Canyon Ranch
Catholic Church (Tucson)
Pima County Assoc. of Governments
Food Conspiracy News
Tucson Women's Bowling Association
Department of Wildlife Ecology
Division of Natural Sciences
Holy Cross Homeowners
National 4-Wheel Drive Association
Huachuca Audubon
Pennsylvania Club
Roadrunner 4-Wheelers
Jacobs YMCA
Woman's Club
Wilderness Society
(Washington, D.C.)
Am. Mining Congress
International Ecology Society
Lab Ornithology
Laquachi Bowmen
Tucson Advertising Clubs
Latter Day Sts. (Tucson)
LDS (Tucson)
League of Women Voters
Audubon Society
(Mt. Diablo, California)
Lions Club
Archbold Biological Str.
Lone Mountain Ranch
Longbow Shooters Digest
National Wildlife Federation
(Washington, D.C.)
Madera Canyon Improvement Assoc.
Madera Canyon Resort
Loma Linda Permittees Association
AZ Trappers Association
Mission Mortuary
Sierra Club (Washington, D.C.)
AWF & SAWC
Mining Club SW
Telesis Property Owners
Saguaro Horsemen's Association

Other Individuals, Organizations, Associations and Businesses: (Continued)

Mt. Graham Cabin Owners
Museum of Northern AZ
Museum of New Mexico
Nat. Audubon Society (New York)
Natural History Institute
Sierra Vista Fire Department
So. AZ Cattlemen Protective Assoc.
Graham County Wildlife
Octillo Garden
N.O.R.B.A.
Natural Resource Defense Council
Xerces Society
Parker Canyon Lake Marina, Inc.
San Carlos Irrigation
AZ Woolgrowers Association
Association for Cave Conservation
Pena Blanca Resort
Tucson Repeater Association
Pima Sanita #1
Pine Canyon Methodist Camp
Pio Decimo Center
Natl. Audubon (Rocky Mtn. Office, CO)
Preston Larson Estate
Handi-Dogs of Tucson
Arizona Wildlife Federation (Tucson)
Southern Arizona Hiking Club
Rifle/Pistol Association
AZ Trappers Association
National Forest Products Association
Tucson Audubon
Southern AZ Environmental Council
Southern AZ Restr. Association
Southern CA-AZ Methodist Church
Southern AZ Hang Gliders
S.A.I.L.A.
Sabino Enterprise
Safari Club International
Sah. Girl Scout (Tucson)
Salvation Army
San Rafael Valley
Paradise Cemetery Association
Santa Cruz Chamber of Commerce
Santa Rita Improvement Association
Santa Rita Lodge
Turkey Flat Summerhome Association
Sierra Club (Alaska)
AZ Habitat Association
National Institute of Health
Smithsonian Institution
So. Branch YWCA (Tucson)
Eastern AZ Amateur Radio
Wilderness & Land Use Commission
St. Mark's Presbyterian Church
Southwest Forest Industries
S. AZ Sportsman & Gun Club
Cochise Cty Coop. Extension Service
Summerhaven Home Owners
Lake Pleasant Reg. Park
SW Environmental Services
SW NM Audubon
T. Roosevelt Council
Tucson Organic Garden Club
New Mexico Audubon Council
Broken Arrow Baptist Camp
Oracle Historical Society
Pima Pals Homemakers
AZ Training Program
Tucson Women's Commission
Tucson YMCA
Sangre de Cristo Audubon Society (New Mexico)
Two PWR Partnership
Pueblo Optimist Clubs
Unified School District
AZ Arch. & Historical Society
Vision Quest
Comm. Coordination Council
Alert, AZ Department of Education
AZ Cattle Growers Association
Columbine Summerhome Owners
Boy Scouts of America (Phoenix)
Florida State Museum
Escarbrosa Grotto
Wild. Study Comm., Scottsdale
Wild. Study Comm., Albuquerque
University of Montana
Tucson Mountain Association
Tucson Repeater Association
Stewart Homemakers
Enchanted Hills Homeowners
YMCA Triangle Y Ranch
YMCA, Metro Office
Tucson Garden Club
4H Clubs of Pima County

Other Individuals, Organizations, Associations and Businesses: (Continued)

Businesses

Action Communication
Aero Radio, Inc.
American TV Relay
Aqua Fria Ranch
Arch Consulting
Phelps Dodge Corporation
ASARCO, Inc.
AZ Electric Power Coop.
AZ Public Service Company
AZ Wholesale Supply
B. Otto's Radio
Three Sisters Land & Cattle Company
T.G.& E.
Bella Vista Ranches, Inc.
Bercich Cattle
Canyon Apiary & Orchard Company
Lebanon Reservoir & Ditch Company
Arizona Sonora Desert Museum
C & B Venture Company
Canyon States Comm., Inc.
Cit. Utilities
City of Tucson Communication Division
Finical and Dombrowski
Columbus Electric Coop., Inc.
Columbus Electric
Cont. Materials Mining Div. Office
Cumming Ranch
Custom Farm Svd.
E. J. DuPont de Nemours & Co.
Wilderness Digest Editor
E Lazy H Ranch
Eastern AZ Amateur Radio Society, Inc.
El Paso Natural Gas Company
Flash Comm. Co.
Uranerz U.S.A., Inc.
Freeport Exp. Co.
Gila Communications
Mt. Lemmon Coop Water Company
Golden Eagle Distributors
Graham County Electric
Granite Construction
Nicksville Water Company
Parker Lakeview Estates Ltd.
GTE Spring Comm.
Gulf Minerals Res.
Sulphur Springs Valley Coop.
Wave Manufacturing
Hughes Air Corp.
GEM Group - AZ Partnership
TAKO Mining Company
Jim Smith & Co.
Kerr McGee Res.
Oracle Ridge Mining Partners
Lane Mountain Ranch
Lawyers Title Trust Department
Lebanon Reservoir & Ditch Company
Envirosphere Company
M. M. Sundt Construction
Marco Crane and Rigging Company
AZ Electric Power Coopertive
Master Communications
Master Telephone
Master, Inc.
May Broadcasting
MCI
MCI/ATR
Atlantic Richfield
Mountain Bell
Mt. Lemmon Corporation
New Pueblo Construction
Newberry Energy
Nicor Min. Vent
Public Service Company of New Mexico
Nicor Mineral Ventures
Passport for Adventure
Powers Elevation
Rapid Commun.
RE Miller Paving and Construction
Redburn Tire Company
Riley West, Inc.
New Pueblo Constructors, Inc.
S. Pacific Trans.
Sands Investment Company
Wyoming Mineral Corporation
Phelps Dodge Corporation
Duke City Lumber Company, Inc.
Southwest Gas
Sunset Lumber
Tanner Bro. Con.
Tenneco West, nc.
Trico Electric
Trinity
Tucson Elec Tpr.
Union Oil Company
Uniwestern Corporation
VAL Telephone Company
Victoria Company
Golden Eagle Mining Company
Motorola, Inc.
Walter Dawgie Ski Corporation
Western Building & Mining Corporation
Western Mines
Motorola Comm. & Elec., Inc.
Western Tele-Comm.
ZZ Cattle Corporation
84-Truck-Auto Center

Glossary

A

Access - See Public access.

Acquisition of land - Obtaining full ownership rights by donation, purchase, exchange or condemnation.

Acre equivalent - A unit of measure for structural and nonstructural wildlife habitat improvements converted to acres. One water = 640 acre equivalents (AcEq). Five acre equivalents are counted for every acre fenced, clear cut, seeded/planted and prescribed burn.

Acre-foot - A measurement of water volume. The volume of water that would cover one acre to a depth of one foot, equal to 43,560 cubic feet or 325,851 gallons.

Activity - Actions, measures, or treatments that are undertaken which directly or indirectly produce, enhance, or maintain forest and rangeland outputs or achieve administrative or environmental objectives.

Administration - Execution of an organizational policy to reach predetermined objectives.

Administrative unit - All the National Forest System lands for which one Forest Supervisor has responsibility.

Aesthetics - Pertaining to the quality of human perception of natural beauty (including sight, sound, smell, touch, taste, and movement).

Affected environment - The natural and physical environment and the relationship of people to that environment that will or may be changed by actions proposed.

Afforestion - The establishment of tree cover on an area where trees have not grown previously.

Age Class - Interval of years, commonly 20, into which trees are grouped for management. Example: 1-20 years, 21-40 years.

Agriculture - A broad class of land and resource for the production of biotic crops - whether animal or plant.

Air pollution - Any substance or energy form (heat, light, noise, etc.) which alters the state of the air from what would naturally occur.

Airshed - The air encompassing a specific geographic region.

Allocation - The assignment of a land area to a particular use or uses to achieve management goals and objectives.

Allocation model - See Resource allocation model.

Allotment - See Range Allotment.

Allowable sale quantity - The quantity of timber that may be sold from the area of suitable land covered by the Forest plan for a time period specified by the plan. This quantity is usually expressed on an annual basis as the "average annual allowable sale quantity."

Alternative - In Forest planning, a mix of management prescriptions applied in specific locations to achieve a desired management emphasis as expressed in goals and objectives.

Amenity - The pleasurable, educational, or aesthetic features of the land or resources.

Analysis - In mathematics and computer science, it pertains to solving problems.

Analysis area - The basic land unit of analysis which is used to allocate and schedule management prescriptions. Each analysis area is considered to be homogeneous in terms of input requirements and output response to management practices. Composed of capability areas or portions of capability areas with similar physical attributes, management costs and resource yields.

Analysis of the management situation - A determination of the ability of the planning area to supply goods and services. A phase of the planning process.

Animal unit month - The quantity of forage required by one mature cow (1,000 lbs.), or the equivalent, for one month.

Arterial roads - Roads which service large land areas and usually connect with public highways or other Forest arterial roads to form an integrated network of primary travel routes. The location and standard are determined by a demand for maximum mobility and travel efficiency rather than by a specific resource management service. Usually they are developed and operated for long-term land and resource management purposes and constant service.

AUM - See Animal unit month.

Available and suitable - See Available lands and Suitable lands.

Available lands - Those portions of the Forest not administratively excluded from use for timber harvest or livestock grazing.

Avoidance area - An area having one or more physical, environmental, institutional or statutory impediments to corridor designation.

B

Backlog - Resource jobs needing completion as directed by the deadlines in the Resource Planning Act (RPA). Includes reforestation, thinning and landline location.

Backlog reforestation - Areas needing reestablishment of tree cover due to failure of natural regeneration as a result of site conditions or lack of seed trees.

Backlog thinning - Those areas that had not previously been thinned and were in need of a precommercial thinning as of 1965.

Badlands - Regions where erosion has carved soft rocks into intricate and unique shapes and where vegetation is scanty.

Bankhead-Jones Farm Tenant Act - Authorizes the Secretary of Agriculture to develop a program of land conservation and utilization in order to correct maladjustments in land use, and to assist in controlling soil erosion; promoting reforestation; preserving natural resources; protecting fish and wildlife; developing and protecting recreational facilities; mitigating floods; preventing impairment of dams and reservoirs; conserving surface and subsurface moisture; protecting the watersheds of navigable streams, and protecting the public's health, safety, and welfare.

Basal area - A measurement of how much of a site is occupied by trees. It is determined by measuring the square feet of the diameter of all the trees in an area at breast height (4.5 feet).

Base sale schedule - A timber sale schedule formulated on the basis that the quantity of timber planned for sale and harvest for any future decade is equal to or greater than the planned sale and harvest for the preceding decade, and this planned sale and harvest for any decade is not greater than the long-term sustained yield capacity.

Benefit-cost analysis - An analytical approach to solving problems of choice. Benefit-cost analysis identifies for each objective that alternative which yields the greatest benefit for a given cost or that alternative which produces the required level of benefits for the lowest cost.

Benefit-cost ratio - An economic indicator of efficiency, computed by dividing benefits by cost.

Best management practice - Application of the best available demonstrated control technology, processes, measures and operating methods that are socially, economically and technically feasible for controlling soil loss or improving water quality.

Big game - Those species of larger animals normally managed as a sport hunting resource, e.g., deer, turkey, elk, bear, etc.

Biological growth-potential - The average net growth attainable in a fully stocked natural forest stand.

BLM - Bureau of Land Management, U.S. Department of the Interior.

Board foot - The amount of wood in an unfinished board 1 inch thick, 12 inches long, and 12 inches wide.

C

Canopy - The more or less continuous cover of branches and foliage formed by the crowns of trees and other woody growth.

Capability - The potential of an area of land to produce resources, supply goods and services, and allow resource uses under an assumed set of management practices and at a given level of management intensity. Capability depends upon site conditions such as climate, slope, landform, soils, and geology, as well as the application of management practices, such as silviculture or protection from fire, insects, and disease.

Carrying capacity (range or wildlife) - The maximum stocking rate possible without inducing damage to vegetation or related resources. It may vary from year to year on the same area due to fluctuating forage production.

Cavity nesters - Wildlife species that utilize tree cavities. Primary cavity nesters excavate their own hole. Secondary cavity nesters use natural cavities or cavities created by primary cavity nesters.

CEQ - See Council on Environmental Quality.

Clearcut - Removal of all standing trees over a given area of land in a single cut. Clearcut areas may occur in large or small blocks, patches or strips.

Clearcut harvest - Silvicultural system used to harvest mature trees at rotation age in one cut for the purpose of regenerating a new even-aged stand.

Climax - The culminating stage in plant succession for a given site; where the vegetation has reached a highly stable condition.

Closure - An administrative order restricting either the location, timing, or type of use in a specific area.

CMAI - See culmination of mean annual increment.

Cold-water fishery - Stream and lake waters which support predominantly cold-water species of game or food fishes (e.g., trout, salmon), which have maximum, sustained water temperature tolerances of about 70 degrees Fahrenheit in the summer.

Collector roads - Roads which serve smaller land areas and are usually connected to a Forest arterial road or public highway. They collect traffic from Forest local roads or terminal facilities. The location and standard are influenced by both long-term multi-resource service needs and travel efficiency. Forest collector roads are operated for constant service.

Commercial Forest - Forest land capable of producing merchantable timber, currently or prospectively accessible, and not withdrawn from such use. Excludes pinyon-juniper woodlands.

Commercial thinning - Thinning in tree stands with diameters greater than 5 inches for which there is a market value for pulpwood and/or small saw logs.

Common variety minerals - See Minerals, common variety.

Concern - See Management concern.

Consumptive use - A use of resources that reduces the supply. May be renewable, such as timber or forage harvest; or non-renewable, such as mineral extraction.

Contiguous analysis area - An analysis area confined within a single geographic area that is associated with a single issue, problem or management concern.

Controlled burn - A deliberate application of fire to an area where control is exercised. See prescribed fire.

Cord - A unit of volume measurement containing 78 cubic feet of solid wood. Generally a stack of round or split wood measuring 4 feet wide by 4 feet high by 8 feet long.

Coronado National Forest - The administrative title of the National Forest System lands administered by the Forest Service from Tucson, Arizona.

Corridor - A linear strip of land identified for the present or future location of transportation or utility right-of-way.

Cost efficiency - The usefulness of specified inputs (costs) to produce specified outputs (benefits). In measuring cost efficiency, some outputs, including environmental, economic, or social impacts, are not assigned monetary values but are achieved at specified levels in the least cost manner. Cost efficiency is usually measured using present net value, although use of benefit-cost ratios and rates-of-return may be appropriate.

Council on Environmental Quality - An advisory council to the President established by the National Environmental Policy Act of 1969. It reviews federal programs for their effect on the environment, conducts environmental studies, and advises the President on environmental matters.

Cover - Plants or plant parts, living or dead, used by wildlife for protection from predators, weather, or in which to reproduce.

Criteria - Predetermined factors for comparing alternatives to facilitate and expedite the decision making process.

Critical habitat - That portion of wild animal's habitat that is critical for the continued survival of the species.

Cubic foot - In timber management a volume measured as a 1 foot cube of solid wood.

Culmination of mean annual increment (CMAI) - Point in time in the age of a forest stand in which the mean annual growth increment no longer increases.

Cultural resources - The physical remains (artifacts, ruins, burial mounds, petroglyphs, etc.) which represent former human cultures.

Culture - The complex whole which includes knowledge, beliefs, art, morals, customs, and any other capabilities and habitats peculiar to a society.

Cunit - Equivalent to 100 cubic feet of solid wood.

Current direction - The program level currently being used to implement the 1980 RPA program.

Cutting cycle - The planned, recurring period of time between successive cuttings or harvests in a stand of trees.

D

Data - Any recorded measurements, facts, evidence, or observations reduced to written, graphical, tabular, or computer form.

DBH - Diameter at breast height. Diameter of a tree approximately 4½ feet above the ground.

Decision unit - The smallest component of an alternative for which relevant inputs (costs) and outputs (benefits) are analyzed. A general term that applies to analyses at any level. Decision units may be grouped for decision making into aggregates called decision variables.

Decision variable - A component of an alternative in which input costs, outputs and benefits are identified and used for analysis and decision making.

DEIS - See draft Environmental Impact Statement.

Demand - The quantity of a good or service called for by society at a given price.

Departure - Timber harvest schedule which deviates from the principle of nondeclining even flow by exhibiting a planned decrease in the timber sale and harvest schedule in the future. A departure is characterized as a temporary increase over the base sale schedule without impairing the Forest's long-term sustained-yield.

Developed recreation - Use of a developed recreation site.

Developed recreation site - A distinctly defined area where facilities are provided for concentrated public use, e.g., camp grounds, picnic areas, swimming area.

Direction - See Management direction.

Discount rate - The interest rate used in plan formulation and evaluation for discounting future benefits and computing costs, or otherwise converting benefits to a common time basis.

Dispersed recreation - Recreation use which occurs outside developed sites.

District - See Ranger district.

Diversity - The distribution and abundance of different plant and animal communities and species within the area covered by a land and resource management plan.

Draft Environmental Impact Statement (DEIS) - The version of the statement of environmental effects required for major Federal actions under Section 102 of the National Environmental Policy Act (NEPA) and released to the public and other agencies for review and comment. It is a formal document which must follow the requirements of NEPA, the Council on Environmental Quality (CEQ) Guidelines, and directives of the agency responsible for the project proposal.

E

Ecosim - A computer program used to simulate timber growth based on site index, basal area, species, mortality, mistletoe and silvicultural objectives.

Ecosystem - The system formed by the interaction of a group of organisms and their environment.

Ecotone - see edge

Edge - The place where plant communities meet or where successional stages or vegetative conditions within plant communities come together. It often contains organisms from both communities as well as those restricted to the interface area. The number of species present is often greater than the surrounding communities.

Effects - Results expected to be achieved from implementation of the alternatives relative to physical, biological, and social (cultural and economic) factors. Examples of effects are tons of sediment, pounds of forage, person-years of employment, income, etc. There are direct effects, indirect effects, and cumulative effects.

Endangered species - A species which is in danger of extinction throughout all or a significant portion of its range--other than members of the class Insecta--and which have been designated under the provisions of the Endangered Species Act of 1973.

Endemic organism - A taxonomic category (e.g., genus, species, variety) whose natural occurrence is confined to a certain region and whose distribution is relatively limited.

Ending inventory constraint - See perpetual timber harvest constraint.

Environment - All the conditions, circumstances and influences surrounding and affecting the development of an organism or group of organisms.

Environmental assessment - A document which displays a comparison of the effects of a proposed project and alternatives to it on the environment.

Environmental impact statement - See Draft environmental impact statement and Final environmental impact statement.

Environmental setting - See Management situation.

Erosion - The processes whereby earthy or rocky material is worn away, loosened, dissolved and removed from any part of the earth's surface.

Erosion, natural - Wearing away of the earth's surface by natural agents under natural environmental conditions of climate, vegetation, etc., undisturbed by man.

Evapotranspiration - Process by which water moves from the soil to the atmosphere by evaporation from the soil or transpiration through plants.

Even-aged management - The application of a combination of actions that result in the creation of stands in which trees of essentially the same age grow together. Managed even-aged forests are characterized by a distribution of stands of varying ages (and, therefore, tree sizes) throughout the forest area. The difference in age between trees forming the main canopy level of a stand usually does not exceed 20 percent of the age of the stand at harvest rotation age. Regeneration in a particular stand is obtained during a short period at or near the time that a stand has reached the desired age or size for regeneration and is harvested. Clearcut, shelterwood, or seed tree cutting methods produce even-aged stands.

Exclusion area - An area having a statutory prohibition to right-of-way for lineal facilities or corridor designation.

F

Fawning areas - The areas, usually on spring ranges, where deer does give birth to fawns and tend them for a few days or weeks.

Feasibility - The relative advantage of managing or improving a land unit, considering its capability and suitability for specific use under the existing or projected socioeconomic climate.

Fire Suppression Terminology

Confine: To limit fire spread within a predetermined area principally by use of natural or preconstructed barriers or environmental conditions. Suppression action may be minimal and limited to surveillance under appropriate conditions.

Contain: To surround a fire, and any spot fires therefrom, with control line as needed, which can reasonably be expected to check the fires spread under prevailing and predicted conditions.

Control: To complete the control line around a fire, any spot fires therefrom, and any interior islands to be saved, burn out any unburned area adjacent to the fire side of the control line and cool down all hot spots that are immediate threats to the control line, until the line can reasonable be expected to hold under foreseeable conditions.

Escaped Fire: A fire which has exceeded, or is anticipated to exceed, pre-planned initial action capabilities or the fire management direction.

Final Environmental Impact Statement (FEIS) - The final version of the statement of environmental effects required for major Federal actions under Section 102 of the National Environmental Policy Act (NEPA). It is a revision of the draft environmental impact statement to include public and agency responses to the draft. It is a formal document which must meet legal requirements and is the document used as a basis for judicial decisions concerning compliance with NEPA.

Firewood - Wood, either round, split or sawed, and burned primarily for heating purposes.

Fisheries habitat - Streams, lakes, and reservoirs that support fish.

Floodplain - That portion of a stream valley, adjacent to the channel which is covered with water when the stream overflows its banks at flood stages.

Forage - All browse and nonwoody plants that are available to livestock or game animals for grazing or harvesting for feeding. The weight may be expressed as either green, air dry or oven dry. The term may also be modified as to time of production such as annual, current year's or seasonal forage production.

Forest land - Land at least 10 percent occupied by forest trees of any size or formerly having had such tree cover and not currently developed for non-forest use. Lands developed for non-Forest use include areas for crops, improved pasture, residential or administrative areas, improved roads of any width and adjoining clearings and powerline clearings of any width.

Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA - An Act requiring the preparation of a program for the management of the National Forests' renewable resources and of land and resource management plans for units of the National Forest System. It also requires a continuing inventory of all forest and rangelands and renewable resources nation-wide.

Forest development roads - Roads that are part of the Forest transportation system, which includes all existing and planned roads, as well as other special and terminal facilities designated as Forest development transportation facilities.

Forest Plan - See National Forest land and resource management plan.

Forest Supervisor - The official responsible for administering the National Forest System lands in a Forest Service administrative unit. Reports to the Regional Forester.

Forest standard - A performance criterion indicating acceptable norms or specifications that actions must meet to maintain the minimum conditions for a particular resource. This type of standard applies to all areas of the Forest regardless of the other management area direction applied.

FORPLAN - Acronym for Forest Planning Model. A linear programming computer model used for developing and analyzing alternatives.

Fuelbreak - Any natural or constructed barrier used to segregate, stop, and control the spread of fire or to provide a control line from which to work.

Fuels - Anything within the Forest that will burn. Usually live and dead woody vegetation, e.g., grass, shrubs, trees.

Fuel treatment - The rearrangement or disposal of fuels to reduce the fire hazard. Fuels are defined as both living and dead vegetative materials consumable by fire.

Fuelwood - See Firewood.

Full capacity range - Rangelands that are accessible to livestock, produce forage or have inherent forage producing capabilities, are stable because of effective ground cover and can be grazed on a sustained yield basis under reasonable management goals.

G

Game species - Any species of wildlife or fish normally harvested by hunters, trappers, and fishermen under state or federal Laws.

Geological area - A unit of land which has been designated by the Forest Service as containing outstanding formations or unique geological features, including caves and fossils. Areas of this type are identified and formally classified because of their recreational and educational values.

Goal - A concise statement that describes a desired condition to be achieved sometime in the future. It is normally expressed in broad, general terms and is timeless in that it has no specific date by which it is to be completed. Goal statements form the principal basis from which objectives are developed.

Goods and services - The various outputs, including on-site uses, produced from forest and rangeland resources.

Grazing - Consumption of range or pasture forage by animals.

Grazing allotment - See Range allotment.

Grazing association - See Grazing District.

Grazing capacity - The maximum stocking rate possible without damage to vegetation or related resources.

Grazing permittee - An individual who has been granted written permission to graze for a specific period on a range allotment.

Grazing season - 1. A period of grazing to obtain optimum use of the forage resource. 2. On public lands an established period for which grazing permits are issued.

Ground water - Water in a saturated zone of a geologic stratum.

Growing stock level (GSL) - The stand density level, usually expressed as number of trees per acre or basal area per acre in square feet, required to maintain an optimum growth through the life of a stand. Trees per acre at 10 inch dbh and above equals the square foot basal area per acre.

Guideline - An indication or outline of policy or conduct.

H

Habitat - The natural environment of a plant or animal. The locality where the organism may generally be found and where all essentials for its development and existence are present. Habitats are described by their geographical boundaries, or with such terms as "shady woodlands," "banks of streams," "dry hillsides," etc.

Habitat diversity - See Wildlife habitat diversity.

Herbage - Herbs taken collectively, usually used in the same sense as forage, except that it may include material not palatable to grazing or browsing animals.

Hydrologic function - The behavioral characteristics of a watershed described in terms of it's ability to sustain favorable conditions of water flow.

I

Improvement - Manmade developments such as roads, trails, fences, stock tanks, pipelines, power and telephone lines, survey monuments, and ditches.

Indicator species - A wildlife species whose presence in a certain location or situation at a given population level indicates a particular environmental condition. Population changes are believed to indicate effects of management activities on a number of other wildlife species.

Information notice - A letter attached to a mineral lease advising applicant that constraints in addition to standard stipulations in lease may be added once a drilling plan is submitted.

Input/output analysis - A systematic technique for analyzing the interdependence of producing and consuming units in an economy. It studies the interrelationship between products offered in the market place. It is a useful tool for separating the component parts of an economy to determine the influence of each on the other for short run forecasting and policy guidance.

Integrated pest management - A process for selecting strategies to regulate forest pests in which all aspects of a pest-host system are studied and weighed. The information considered in selecting appropriate strategies includes the impact of the unregulated pest population on various resource values, alternative regulatory tactics and strategies, and benefit/cost estimates for these alternative strategies. Regulatory strategies are based on sound silvicultural practices and ecology of the pest-host system and consist of a combination of tactics such as timber stand improvement plus selective use of pesticides. A basic principle in the choice of strategy is that it be ecologically compatible or acceptable.

Interdisciplinary team - A group of individuals with different training assembled to solve a problem or perform a task.

Intermediate development level - A level of modification for developed recreation sites. Modification is moderate, equally protecting both site and users. Generally, facilities are made of native materials and vehicle traffic controls are inconspicuous. Roads may be hard surfaced and trails formalized. Development density is about three family units per acre. Forest environment is essentially natural.

Interpretive services - Information services designed to present inspirational, educational, and recreational values to Forest visitors to provide the utmost in understanding, appreciation and enjoyment from their Forest experience.

Irretrievable resource commitment - Allocation decision causing loss of production or use of a renewable resource.

Irreversible resource commitment - Allocation decision affecting nonrenewable resources--soil, minerals and cultural resources--causing permanent loss of these resources.

Issue - See Public issue.

Land exchange - The conveyance of non-Federal land or interest in the land to the United States in exchange for National Forest System land or interest in the land.

Landline location - Location of Forest property boundaries.

Less than standard service management - Management of developed sites, wilderness, and dispersed areas to provide service below established standards and objectives.

Lifestyle - A characteristic way of living which may be an individual variant within the cultural mainstream or may be an individual expression of a subculture. "Lifestyles" are generally expressed through the means of economic sustenance, dwelling site and type, group associations, and social practices such as family form, religious practices, sexual mores, style of dress and type of diet.

Limited surface occupancy - Stipulation(s) added to standard mineral lease specifying limitation(s) on specific area(s).

Local roads - Local roads are usually one-lane roads constructed to serve a dominant use or resource. Local roads do not access large land areas since they are more site specific than arterial and collector roads.

Locatable minerals - See Minerals, locatable.

Long-term effects - Those effects which will be significant beyond the RPA planning horizon of 50 years.

Long-term sustained yield capacity (LTSYC) - The highest uniform wood yield from lands being managed for timber production that may be sustained under a specified management intensity consistent with multiple-use objectives.

LTSYC - See long-term sustained yield capacity.

M

M - Thousand.

MM - Million.

Management area standard and guidelines - Management practices selected and scheduled for application in a specific area to attain multiple use and other goals and objectives.

Management concern - An issue, problem, or a condition which constrains the range of management practices identified by the Forest Service in the planning process.

Management direction - A statement of multiple-use and other goals and objectives, the associated management prescriptions, and standards and guidelines for attaining them.

Management indicator species - See indicator species.

Management intensity - A management practice or combination of management practices and associated costs designed to obtain different levels of goods and services.

Management opportunity - A statement of general actions, measures, or treatments that address a public issue or management concern in a favorable way.

Management practice - A specific activity, measure, course of action, or treatment.

Management prescription - Management practices and intensity selected and scheduled for application on a specific area to attain multiple-use and other goals and objectives.

Management situation - A comprehensive statement of the planning area resources, its history, past and present uses, and a review of the public's concerns with the area.

Management standards and guidelines - See Standard and Guideline.

Mature sawtimber - Trees that have attained full development and the growth rate has leveled off.

Maximum potential - The maximum potential output level that can be attained.

Mineral development - The activities and facilities associated with extracting a proven mineral deposit.

Mineral entry - Filing a mining claim on public land to obtain the right to any minerals it may contain.

Mineral exploration - The search for valuable minerals on lands open to mineral entry.

Mineral production - Extraction of mineral deposits.

Mineral withdrawal - Public lands withdrawn from mineral entry under the General Mining Laws and the mineral leasing laws. Lands withdrawn usually have unique features which are highly valued by the public or are needed for administrative purposes.

Minerals, common variety - Deposits which--although they may have value for use in trade, manufacture, the sciences, or in the mechanical or ornamental arts--do not possess a distinct, special economic value. May include sand, stone, gravel, pumicite, cinders, pumice (except that occurring in pieces of two inches on a side), clay, and petrified wood.

Minerals, leasable - Coal, oil, gas, phosphate, sodium, potassium, oil shale, sulphur (in Louisiana and New Mexico), and geothermal steam.

Minerals, locatable - Those hard rock minerals which are mined and processed for the recovery of metals. May include certain nonmetallic minerals and uncommon varieties of mineral materials such as valuable and distinctive deposits of limestone or silica. May include any solid, natural inorganic substance occurring in the crust of the earth, except for the common varieties of mineral materials and leasable minerals.

Mining claim - That portion of the public estate held for mining purposes in which the right of exclusive possession of locatable mineral deposits is vested in the locator of a deposit.

Mining claim, patented - A mining claim to which a patent has been secured from the Government by compliance with the laws relating to such claims.

Mining patent - The patent is a legal document which conveys the title to the ground (i.e., ownership) to the claim's owner.

Multiple use - The management of all the various renewable surface resources of the National Forest System so that they are utilized in the combination that will best meet the needs of the American people; making the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions; that some lands will be used for less than all of the resources; and harmonious and coordinated management of the various resources, each with the other, without impairment of the productivity of the land, with consideration being given to the relative values of the various resources and not necessarily the combination of uses that will give greatest dollar return or the greatest unit output.

N

National Environmental Policy Act (NEPA) - An act declaring a National policy to encourage productive and enjoyable harmony between man and his environment, to promote efforts which will prevent or eliminate damage to the environment and the biosphere and stimulate the health and welfare of man, to enrich the understanding of the ecological systems and natural resources important to the Nation and to establish a Council on Environmental Quality.

National Fire - Danger Rating System (NFDRS) - System used to rate current and expected fire danger from low to extreme based upon weather, fuels and risk.

National Forest Land and Resource Management Plan - A plan developed to meet the requirements of the Forest and Rangeland Renewable Resources Planning Act of 1974, as amended, that guides all resource management activities and establishes management standards and guidelines for the National Forest System lands of a given National Forest.

National Forest Management Act (NFMA) - A law passed in 1976 that amends the Forest and Rangeland Renewable Resources Planning Act and requires the preparation of Forest plans.

National Forest System land - National Forests, National Grasslands, and other related lands for which the Forest Service is assigned administrative responsibility.

National Recreation Trails - Trails designated by the Secretary of the Interior or the Secretary of Agriculture as part of the national system of trails authorized by the National Trails System Act. National Recreation Trails provide a variety of outdoor recreation uses in or reasonably accessible to urban areas.

National Register of Historic Places - A list (maintained by the National Park Service) of areas which have been designated as being of historical significance. The Register includes places of local and state significance as well as those of value to the Nation.

National Wild and Scenic River System - Rivers with outstanding scenic, recreational, geological, fish and wildlife, historic, cultural, or other similar values designated by Congress under the Wild and Scenic Rivers Act for preservation of their free-flowing condition.

National Wilderness Preservation System - Pristine Federal lands designated by the Wilderness Act of 1964 and subsequent wilderness legislation. Generally, these lands are untouched by "works of man."

Natural prescribed fire - See Prescribed fire.

NEPA - See National Environmental Policy Act.

Net public benefits - An expression used to signify the overall long-term value to the Nation of all outputs and positive effects (benefits) less all associated inputs and negative effects (costs) whether they can be quantitatively valued or not. Net public benefits are measured by both quantitative and qualitative criteria rather than a single measure or index. The maximization of net public benefits to be derived from management of units of the National Forest System is consistent with the principles of multiple use and sustained yield.

NFMA - See National Forest Management Act.

No action alternative - The most likely condition expected to exist in the future if current management direction would continue unchanged.

No surface occupancy - Stipulation added to standard mineral lease permitting extraction but prohibiting occupancy of the surface of the lease.

Nonconsumptive use - Use of a resource that does not reduce the supply, such as many types of recreation. (See also Consumptive use.)

Noncontiguous analysis area - An analysis area consisting of many parcels of biologically homogeneous land scattered throughout the Forest.

Nondeclining even flow or yield - Refers to a harvest schedule in which the harvest for any future decade is equal to or greater than the planned sale and harvest for the preceding decade of planning period.

Nongame wildlife - Species of animals which are not managed as a sport hunting or fishing resource.

Non-point source pollution - The Environmental Protection Agency defines non-point source pollution in terms of activities rather than specific conveyances. Non-point sources of pollution are the result of activities which are initiated or caused by natural processes, including precipitation, drainage, seepage, percolation, and runoff; or is not traceable to any discreet or identifiable facility. The term silvicultural non-point source includes activities inherent to forest management which accelerate the effects of natural processes. Such activities include nursery operations, site preparation, reforestation and subsequent culture, thinning, prescribed burning, pest and fire control, harvesting operations, and the construction and maintenance of roads and other transportation systems associated with these activities.

Nonstructural range improvement - Practices and treatments undertaken to improve range not involving construction of improvements.

O

Objective - A concise, time-specific statement of measurable planned results that respond to pre-established goals. An objective forms the basis for further planning to define the precise steps to be taken and the resources to be used in achieving identified goals.

Obliterate - The action needed to close an unneeded road and return the land to production.

Occupancy trespass - The illegal occupation or possession of National Forest land or property.

Old growth - The final successional stage of a stand of trees. Characterized by a high degree of decadence because of declining health and vigor. Tree ages are in excess of 120 years.

On site soil loss - The movement of soil from the point at which it was formed to another location.

Opportunity - See Management opportunity.

ORV - Off-road vehicle. This includes all mechanical means of transportation; passenger cars, 4-wheel drive pickups, trail bikes, snowmobiles or other ground transportation vehicles that are capable of traveling overland where no roads exist.

ORV closure - An administration order closing a land area to specified types of off-road vehicle travel yearlong.

ORV restriction - An administrative order restricting a land area to specified types of off-road vehicle travel during specific seasons or conditions.

Outputs - The goods, services and products which are measurable and capable of being used to determine the effectiveness of programs and activities in meeting objectives. Also goods, end products, or services that are purchased, consumed, or utilized directly by people. A broad term for describing any result, product, or service that a process or activity actually produces.

Overstory - The portion of trees in a forest which forms the upper most layer of foliage.

Overstory modification - Removal of 80 percent or more of the overstory to increase production of grass and browse for utilization by livestock and wildlife.

P

Particulates - Small particles which are suspended in the air and generally are considered pollutants.

Pasture - An area, generally enclosed, providing grass and other growing herbage suitable as food for grazing animals. Sometimes called paddock.

Patented land - Public lands conveyed to private ownership most commonly by homestead, mining or land exchange laws.

People at one time (PAOT) - The number of people that can use a recreation opportunity at any one time without substantially diminishing the quality of the experience sought after.

Perennial interrupted stream - Water course containing occasional perennial surface water due to ground water interception with intervening intermittent reaches exhibiting a saturated moisture regime beneath the channel bed.

Permitted grazing - Use of a National Forest range allotment under the terms of a grazing permit.

Personal use - Normally used to describe the type of permit issued for removal of wood products (firewood, posts, poles, latillas, and Christmas trees) from National Forest land when the product is for home use and not to be resold for profit.

Perpetual timber harvest constraint:
The NFMA Regulations require:
Each sale schedule shall provide for a forest structure that will enable perpetual timber harvest which meets the principle of sustained yield and multiple-use objectives of the alternative (36 CFR 219.16 (a)(2)(iv).

The perpetual timber harvest (ending inventory) constraint attempts to meet this requirement by insuring that for each regeneration prescription, the net merchantable timber inventory for an analysis area in the last 10 year period of the planning horizon, i.e., the twentieth decade, is equal to the sum of the weighted average of net merchantable timber volume for each regenerated strata (age class) in the prescription during each regenerated strata's rotation length. The average volume for each strata is weighted according to the proportion of the total analysis area acres occupied by the strata. The length of rotation is the number of years from the establishment of a strata until the strata is finally harvested.

Pesticide - Any organic or inorganic preparation used to control populations of injurious organisms, plant or animal.

Planning area - The area covered by a Forest Plan.

Planning Criteria - Standards, tests, rules and guidelines by which the planning process is conducted and upon which judgments and decisions are based.

Planning horizon - The overall time period considered in the planning process that spans all activities covered in the analysis or plan and all future conditions and effects of proposed actions which would influence the planning decisions.

Planning period - Generally one decade. The time interval within the planning horizon that is used to show incremental changes in yields, costs, effects, and benefits.

Planning questions - A major policy question of long range significance, derived from the public issues and management concerns, to be addressed when selecting among alternative Forest plans.

Planning records - A system that records decisions and activities that result from the process of developing a forest plan, revision, or significant amendment.

Point source pollution - Silvicultural point source pollution as defined to be those forestry related activities in which and discernible, confined and discreet conveyance related to rock crushing, gravel washing, log sorting or log storage facilities from which pollutants are discharged into the waters of the United States.

Potential natural vegetation - Vegetation that would exist today if man were removed from the scene and if resulting plant succession were telescoped into a single moment.

Practice - See Management practice.

Precommercial thinning - Thinning trees with diameters under 5 inches where material thinned does not have a market value. Selective cutting of trees with an objective of removing the least desirable trees and improving the spacing of remaining trees to accelerate growth.

Preferred alternative - The alternative recommended for implementation as the Forest Plan based on the evaluation completed in the planning process. (See Proposed Action).

Preparatory cut - Removal of mature trees near the rotation age in a shelterwood harvest for the purpose of opening the canopy to encourage development of cone bearing crowns for seed production on the remaining trees.

Prescribed fire - The natural or intentional application of fire to wild land fuels under such conditions as to allow the fire to be confined to a predetermined area, intensity of heat and rate of spread. Required to obtain planned resource objectives.

Prescription controls - Prescription controls were used in FORPLAN to require the model to assign specific amounts of specified prescriptions to an analysis area in order to achieve a desired management practice and/or intensity of management or a

desired funding level for a particular resource area. Prescription controls limit the percentage of an analysis area that can be allocated to a specified prescription level or combination of levels.

Present net value (PNV) - The difference between the discounted value (benefits) of all outputs to which monetary values or established market prices are assigned and the total discounted costs of managing the planning area.

Present value of benefits (PVB) - Cumulative discounted benefits to 2080.

Present value of costs (PVC) - Cumulative discounted costs to 2080.

Primitive roads - Roads constructed with no regard for grade control or designed drainage, sometimes by merely repeated driving over an area. These roads are single lane, usually with native surfacing and sometimes passable with 4-wheel drive vehicles only, especially in wet weather.

Productivity - See Site productivity.

Proposed action - Specified in the National Environmental Policy Act as the project, activity, or decision that a Federal agency intends to implement or undertake which is the subject of an environmental impact statement.

Public - The people of an area, state, or nation that can be grouped together by a commonality of interests, values, beliefs, or lifestyles.

Public access - Usually refers to a road or trail route over which a public agency claims a right-of-way available for public use.

Public issue - A subject or question of widespread public interest relating to the management of National Forest System.

Put-to-bed - Action needed to place a local road in a low maintenance condition during a period of low use by surface stabilization, revegetation and drainage structures.

R

Range allotment - A designated area available for livestock grazing upon which a specified number, kind of livestock and season of use may be grazed under a term grazing permit. The basic unit used to facilitate management of the range resource on National Forest System and associated lands administered by the Forest Service.

Range condition - The state or health of the range vegetation and soil to produce a stable biotic community based on the composition, density, and vigor of the vegetation and the physical characteristics of the soil. Condition is expressed as satisfactory or unsatisfactory.

Range improvement - Any structure or nonstructural improvement to facilitate management of rangelands or livestock.

Rangeland - Land where the vegetation is predominantly grasses, grass-like plants, forbs, or shrubs suitable for livestock grazing and browsing.

RANGELAND model - Computer model developed by Region 3 to estimate available forage for livestock based on plant physiology, range condition class and overstory crown cover.

Range management - The art and science of planning and directing range use to obtain sustained maximum animal production, consistent with perpetuation of the natural resource.

Range management intensity levels
Level A - Livestock grazing is entirely eliminated or restricted to situations where it will meet other resource objectives, such as fuel hazard reduction in recreation areas. Areas managed under Level A are not counted in the determination of livestock forage capacities.

Level B - Livestock grazing is very limited. Management is generally accomplished by moving livestock from one place to another. On areas managed under Level B, capacity and actual use are kept in balance by removing or adding livestock. There is very little structural improvement work done, such as fences or water development, and no forage improvement work.

Level C - Level C management controls livestock use through the use of structural improvements and physical movement of livestock. Long-term capacities are balanced with use through adjustments in numbers of livestock. Any forage improvement is generally the result of meeting other resource objectives, such as wildlife habitat improvement.

Level D - Areas under Level D management are managed intensively for livestock grazing within an overall multiple-use concept. Any structural or nonstructural (forage) improvement technique may be used as long as it fits with the natural environment. All reasonable and approved management techniques are applied to sustain capacity and use at high levels.

Level E - Level E management is applied to areas to achieve the maximum livestock production that the land can support. Any management technique can be applied as long as basic watershed values are protected. Some management activities, such as irrigating or large scale planting of non-native grass species, may change the natural character of the land.

Ranger District - Administrative subdivisions of the Forest supervised by a District Ranger who reports to the Forest Supervisor.

RARE II - See Roadless Area Review and Evaluation II.

Real dollar value - A monetary value which compensates for the effects of inflation.

Reconstruction - Road or trail construction activities which take place on an existing road or trail and raise the standard of the road or trail. This can include relocation of the facility in a completely new location.

Receipt shares - The portion of receipts derived from Forest Service resource management that is distributed to State and county governments, such as the Forest Service 25 percent fund payments.

Record of Decision - A document, separate from but associated with an environmental impact statement, that publicly and officially discloses the responsible official's decision on which alternative assessed in the EIS will be implemented.

Recreation Opportunity Spectrum (ROS) - A method of delineating types of recreation settings. There are six ROS settings. Only the first four are evident on the Coronado National Forest. These settings are: Primitive - Essentially unmodified natural environments; Semi-Primitive Non-Motorized - Predominantly natural or natural appearing environments without motorized use; Semi-Primitive Motorized - Predominantly natural or natural appearing environments where motorized use occurs; Roaded Natural - Predominantly natural appearing environments with moderate evidence of the sights and sounds of man; Rural - Modified natural environment with facilities for special activities; Urban - substantially urbanized environment.

Recreation Visitor Day (RVD) - A unit for measuring recreation activities which aggregate 12 visitor hours. May consist of one person for 12 hours, 12 persons for one hour or any equivalent combination of continuous or intermittent recreation use by individuals or groups.

Reforestation - The natural or artificial restocking of an area usually to produce timber and other wood products, but also to protect watersheds, prevent soil erosion, and improve wildlife, recreation and other natural resources. Natural reforestation includes site preparation to reduce competing vegetation and provide a mineral seed bed for seed provided by seed trees. Artificial reforestation is the planting of seedlings, cuttings or seeds by hand or mechanical means and may include site preparation.

Reforestation backlog - See backlog reforestation.

Regeneration - The term is used two ways: 1) The actual seedlings or saplings existing in a young tree stand; or 2) The act of reforesting an area.

Regeneration cutting - The removal of trees intended for the propose of assisting regeneration already present or to make regeneration of the stand possible.

Region - For planning purposes, the standard administrative unit of the Forest Service administered by a Regional Forester.

Region 3 - The Southwest Region. A Forest Service organizational unit consisting of all National Forests in New Mexico and Arizona plus four National Grasslands in Texas, Oklahoma and New Mexico.

Regional Forester - The official responsible for administering a single Region and preparing a Regional Guide.

Regional Guide - The plan developed to meet the requirements of the Forest and Rangeland Renewable Resources Planning Act of 1974, as amended, that guides all natural resource management activities and establishes management standards and also guidelines for the National Forest System lands of a given region. It also disaggregates the RPA objectives assigned to the Region and to the Forest within that region.

Removal cut - Removal of remaining mature trees near rotation age in a shelterwood harvest to provide full sunlight to the regenerated crop.

Research Natural Area - An area set aside by the Forest Service to preserve a representative sample of an ecological community; primarily for scientific and educational purposes. Commercial exploitation is not allowed and general public use is discouraged.

Resource allocation model - A mathematical model using linear programming which will allocate land to prescriptions and schedule implementation of those prescriptions simultaneously. The end purpose of the model is to find a schedule and allocation that meets the goals of the Forest and optimizes some objective function.

Resource - An aspect of human environment which renders possible or facilitates the satisfaction of human wants and the attainment of social objectives.

Resource element - A major Forest Service mission-oriented endeavor which fulfills statutory or executive requirements and indicates a collection of activities from the various operating programs required to accomplish the mission. The eight resource elements are recreation, wilderness, wildlife and fish, range, timber, water, minerals, and human and community development.

Responsible line officer - The Forest Service employee who has the authority to select and/or carry out a specific planning action.

Revegetation - The reestablishment and development of a plant cover. This may take place naturally through the reproductive processes of the existing flora or artificially through the direct action of man--reforestation or range reseeding.

Right-of-way - The right to pass through another person's land as obtained by condemnation or purchase.

Riparian ecosystem - A transition between the aquatic ecosystem and the adjacent terrestrial ecosystem identified by soil characteristics and distinctive vegetation communities that require free or unbound water.

Roadless Area Review and Evaluation (RARE II) - The assessment of unroaded areas within the National Forests as potential wilderness areas. This refers to the second review which was begun in 1977 and documented in a final environmental impact statement, January 1979.

Road density - The number of miles of road per square mile in a land area.

Road maintenance - Level 1 - This level is assigned to intermittent service roads during the time management direction requires that the road be closed or otherwise blocked to traffic. Basic custodial maintenance is performed to protect the road investment and to keep damage to adjacent resources to an acceptable level. Drainage facilities and runoff patterns are maintained.

Roads receiving Level 1 maintenance may be of any type, class, or construction standard and may be managed at any other maintenance level during the time management direction requires that they be open for traffic. However, while being maintained at Level 1, they are closed or blocked to traffic.

Level 2 - This level is assigned where management direction requires that the road be open for limited passage of traffic. Traffic is normally minor, usually consisting of one or a combination of administrative, permitted, dispersed recreation, or other specialized uses. Log haul may occur at this level.

Roads in this maintenance level are normally characterized as single lane, primitive type facilities intended for use by high clearance vehicles. Passenger car traffic is not a consideration.

Level 3 - This level is assigned where management direction requires the road to be open and maintained for safe travel by a prudent driver in a passenger car. Traffic volumes are minor to moderate; however, user comfort and convenience is not considered a priority.

Roads at this maintenance level are normally characterized as low speed, single lane with turnouts and spot surfacing. Some roads may be fully surfaced with either native or processed material. The functional classification of these roads is normally local or minor collector.

Level 4 - This level is assigned where management direction requires the road to provide a moderate degree of user comfort and convenience at moderate travel speeds. Traffic volumes are normally sufficient to require a double lane aggregate surfaced road. Some roads may be single lane and some may be paved and/or dust abated. The functional classification of these roads is normally collector or minor arterial.

Level 5 - This level is assigned where management direction requires the road to provide a high degree of user comfort and convenience. These roads are normally double lane, paved facilities. Some may be aggregate surfaced and dust abated. Functional classification of these roads is normally arterial.

Rotation age - The period of years between initial establishment of a stand of timber and the time when it is regenerated.

RPA - See Forest and Rangeland Renewable Resources Planning Act.

RPA Program - The recommended direction for long range management of renewable resources of National Forest System lands. This direction serves as the basis for the Regional targets assigned to the Forest. The development of this direction is required by the Forest and Rangeland Renewable Resources Planning Act.

RVD - See Recreation Visitor Day.

S

Salables - See Minerals, common variety.

Sale schedule - The quantity of timber planned for sale by time period from an area of suitable land covered by a forest plan. The first period, usually a decade, of the selected sale schedule provides the allowable sale quantity. Future periods are shown to establish that long-term sustained yield will be achieved and maintained.

Salvage harvest - Removal of dead or dying trees resulting from insect and disease epidemics or wildfire.

Sanitation harvest - Removal of dead or dying trees to prevent spread of insects or disease.

Satisfactory range allotments - Range allotments with a combination of management and stocking rate which can be reasonably be expected to result in an overall range condition of fair or better, with a stable or upward trend and a stable soil.

Satisfactory range management - The planned, systematic use of the range resource to achieve utilization of forage for sustained animal production consistent with perpetuation of all natural resources. Factors considered in achieving satisfactory management include the kind, breed and class of livestock, type of ranch operation, permitted numbers, season of use, grazing capacity and natural features which limit optimum distribution.

Sawtimber - Trees suitable in size and quality for producing logs that can be processed into lumber. For planning purposes on the Forest, trees with a nine-inch diameter were classified as sawtimber.

Scoping - Determination of the significant issues to be addressed in an EIS.

SCORP - See State Comprehensive Outdoor Recreation Plan.

Secondary modern development level - A level of modification for developed recreation sites. Modification is heavy with facilities provided strictly for comfort and convenience of users. Construction may use synthetic material and vehicle traffic controls are usually obvious. Artificial surfacing of roads and trails is extensive. Development density is three to five family units per acre. Forest environment is pleasing and attractive but not necessarily natural.

Sediment - Solid material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity, or ice and has come to rest on the earth's surface either above or below sea level.

Sedimentation - The deposition of detached soil and rock material transported by or suspended in water.

Seed cut - Removal of mature trees near rotation age in a shelterwood harvest to permanently open the stand and prepare the site for regeneration from the seed trees left for that purpose.

Seedling/sapling - A forest successional stage in which trees less than five inches in diameter are the predominant vegetation.

Selection cutting - The annual or periodic removal of trees, individually or in small groups from an uneven-aged forest in order to realize the yield and establish a new crop of irregular constitution.

Seral - A plant and animal community which is transitional in stage of succession, being either short- or long-term. If left alone, the seral stage will pass, and another plant and animal community will replace it. Aspen represents a seral stage that would eventually be replaced by conifers such as spruce.

Shelterwood cutting - The removal of a stand of trees through a series of cuttings designed to establish a new crop with seed and protection provided by a portion of the stand.

Shelterwood harvest - Silvicultural system used to harvest mature trees at rotation age in a series of preparatory, seed and removal cuts designed to regenerate a new even-aged crop under the shelter of the old crop.

Short-term effects - Those effects which will not be significant beyond the RPA planning horizon of 50 years.

Silvicultural system - A management process whereby forests are tended, harvested, and replaced, resulting in a forest of distinctive form. Systems are classified according to the method of carrying out the fellings that remove the mature crop and provide for regeneration and according to the type of forest thereby produced.

Silviculture - The science and art of growing and tending crops of forest trees.

Site preparation - Removing unwanted vegetation and debris from a site and preparing the soil before reforestation.

Site productivity - Production capability of specific areas of land.

Size class - For the purposes of Forest planning, size class refers to the intervals of tree stem diameter used for classification of timber in the Forest Plan data base: less than five-inch diameter = seedling/sapling; five to nine-inch diameter = pole timber; and greater than nine-inch diameter = sawtimber.

Slash - Debris left after logging, pruning, thinning, or brush cutting, and large accumulations of debris resulting from windstorms. It includes logs, bark, branches, and stumps.

Small game - Birds and small mammals normally hunted or trapped.

Snag - A standing dead tree from which the leaves and most of the branches have fallen.

Snag recruitment - Reservation of suitable live trees near death for replacement of snags in the future or killing trees to create new snags.

Social analysis - An analysis of the social (as distinct from the economic and environmental) effects of a given plan or proposal for action. Social analysis includes identification and evaluation of all pertinent desirable and undesirable consequences to all segments of society, stated in some comparable quantitative terms. It also includes a subjective analysis of social factors not expressible in quantitative terms.

Soil erosion - The detachment and movement of soil from the land surface by wind, water, or gravity.

Soil productivity - The capacity of a soil to produce a specific plant or sequence of plants under a specific system of management.

Soil survey - See Terrestrial Ecosystem Inventory.

Southwestern Region - See Region 3.

Special cutting - Logging activities in special areas, such as recreation areas and administrative sites, where other uses or values override timber production values.

Special use permits - Permits and granting of easements (excluding road permits and highway easements) authorizing the occupancy and use of land.

Special uses - Special use permits.

Stand - A group of trees on a minimum of 1 acre of forest land that is at least 10 percent stocked by forest trees of any size.

Standard - Performance criteria indicating acceptable norms or specifications that actions must meet. A principle requiring a specific level of attainment, a rule to measure against.

Standard service management - Management of developed sites, wilderness, and dispersed areas to provide optimum service.

Standard stipulations - Constraints added to all mineral leases to protect resource from unnecessary disturbance. Fire, erosion control, payment for damages, cattleguards, pollution, camp construction, Plan of Operation, environmental analysis, protection of threatened and endangered species and cultural resources are covered.

State Comprehensive Outdoor Recreation Plan (SCORP) - Plan prepared by the State which identifies recreation supply and demand and recommends future development actions.

Stocking rate - Range management usage. The actual number of animals, expressed in either animal units or animal unit months, on a specific area at a specific time.

Structural range improvement - Improvement requiring construction or installation to improve the range, facilitate management, or control distribution and movement of livestock.

Suitability - The appropriateness of applying certain resource management practices to a particular area of land, as determined by an analysis of the economic and environmental consequences and the alternative uses foregone. A unit of land may be suitable for a variety of individual or combined management practices.

Suitable lands - Lands which are appropriate for the application of certain resource management practices as determined by an analysis of the economic and environmental consequences and the alternative uses foregone.

Supply potential - The output production possible from available resources.

Sustained yield of products and services - The achievement and maintenance in perpetuity of a high-level annual or regular periodic output of the various renewable resources of the National Forest System without impairment of the productivity of the land.

T

Targets - Objectives assigned to the Forest by the Regional Plan.

Temporary roads - Temporary roads are low-level roads constructed for a single purpose and short-term use. Once use of the road has been completed, it is obliterated, and the land it occupied is returned to production.

Terrestrial Ecosystem Inventory - Systematic inventory based on the concept that within the landscape there are naturally occurring ecosystems with unique sets of properties. These terrestrial ecosystems form a continuum and can be recognized at different levels in classification systems. The soils component of the ecosystem is inventoried through the use of "Soil Taxonomy," USDA Soil Conservation Service Handbook #436, and the "Terrestrial Ecosystem Vadose and Phreatic Survey Procedure," a Forest Service handbook. The vegetation component of the ecosystem is inventoried through the use of the International Classification and Mapping of Vegetation, UNESCO, and the above mentioned Forest Service handbook. The terrestrial ecosystem inventory is sometimes referred to as "soil survey" in the planning document.

Thinning - Cutting made in an immature stand to accelerate diameter growth and improve form of remaining trees.

Threatened and endangered species - See Threatened species and Endangered species.

Threatened species - Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range and which has been designated in the Federal Register by the Secretary of the Interior as a threatened species.

Tiering - Refers to the coverage of general matters in broad environmental impact statements (such as national program or policy statements) with subsequent narrower statements or environmental analyses (such as regional or basin wide program

statements or ultimately site-specified statements), incorporating by reference the general discussions and concentrating solely on the issues specific to the statement in question.

Timber - A general term for the major woody growth of vegetation in a forest area.

Timber production - The purposeful growing, tending, harvesting, and regeneration of regulated crops of trees to be cut into logs, bolts, or other round sections for industrial or consumer use. The term "timber production" does not include production of fuelwood.

Timber stand improvement (TSI) - Cuttings made in an immature stand to accelerate diameter growth and improve the form of the trees that remain.

Topography - The configuration of a land surface including its relief, elevation and the position of its natural and man-made features.

Trailhead - The parking, signing, and other facilities available at the terminus of a trail.

Transportation system - All existing and planned roads and trails needed to access the Forest.

Travelway - An unconstructed two-track road resulting from repeated cross-country travel.

Trick tank - A water development constructed by laying an impervious surface on a collection area and funneling water to a storage use point. The key consideration for trick tanks is they are not placed in defined channels, and therefore are not making use of appropriable water. Commonly constructed of tin, concrete, butyl or treatment soil and sometimes use natural collection from rock outcrops.

TSI - See Timber Stand Improvement.

U

Unclassified area - Refers to the classification of lands for the purpose of establishing utility corridors. It is that land area not previously classified as an exclusion area, avoidance area, window or corridor.

Uneven-aged management - The application of a combination of actions needed to simultaneously maintain continuous high-forest cover, recurring regeneration of desirable species, and the orderly growth and development of trees through a range of diameter or age classes to provide a sustained yield of forest products. Cutting is usually regulated by specifying the number or proportion of trees of particular sizes to retain within each area, thereby maintaining a planned distribution of size classes. Cutting methods that develop and maintain uneven-aged stands are single-tree selection and group selection.

Unpalatable species - In range management usage, plant species that are not readily eaten by animals.

Universal soil loss equation (USLE) - Empirical erosion model that computes long-term average soil losses from sheet and rill erosion under specified conditions.

Unsatisfactory range allotments - Allotments with management intensity of X. Stocking is at least 20 percent overstocked. Range and watershed conditions are deteriorating at a rate which will cause significant management changes and/or investments to correct.

Use season - That period of time developed recreation sites are open for public use, with routine maintenance, cleanup, and operation on a scheduled basis.

USF&WLS - U. S. Fish and Wildlife Service, Department of Interior.

V

Visual Condition - The degree of visual alteration of the landscape. Six condition classes, ranging from pristine to drastic disturbance, define the degree of deviation from a natural appearing landscape.

Visual Quality Objective (VQO) - Measurable standards for the management of visual resources of the landscape. Refers to the degree of acceptable alterations of the characteristic landscape based on the importance of aesthetics. Objectives use in the Proposed Plan are:
Preservation - provides for ecological change only.

Retention - Man's activities are generally not evident to the casual visitor.

Partial Retention - In general man's activities may be evident but must be subordinate to the characteristic landscape.

Modification - Man's activity may dominate the characteristic landscape but must, at the same time, utilize naturally established form, line, color and texture. Man's activities should appear as natural occurrences when viewed from foreground or middle ground.

Maximum modification - Man's activity may dominate the characteristic landscape but should appear as a natural occurrence when viewed as background.

Visual resource - The composite of basic terrain, geological features, water features, vegetative patterns, and land use effects that typify a land unit and influence the visual appeal the unit may have for visitors.

Visual variety class - A classification system for establishing visual landscape categories according to the relative importance of the visual features.

W

Warm-water fishery - Stream and lake waters which support fishes with a maximum summer temperature tolerance of about 80 degrees Fahrenheit. Bluegills, catfish, and largemouth bass are examples.

Watershed - The area that contributes water to a drainage or stream.

Watershed condition - A description of the health of a watershed, or portion there of in terms of the factors which affect hydrologic function and soil productivity.

Water right - A legal ownership of a quantity of water for a given use. In Arizona, water rights are required for all appropriable water which includes groundwater used by commercial agriculture, industry and municipalities and all surface water. In New Mexico, water rights are required for surface water uses only. The Forest Service has reserved water rights for producing timber and maintaining watershed conditions that will provide a favorable flow of water. All other uses by the Forest Service must be covered by water rights gained from the State.

Water yield - That portion of the annual precipitation which contributes to stream flow and recharge of the ground water table.

Weeks Act - Passed in 1911, it set up the National Forest Reservation Commission and authorized the Secretary of Agriculture to purchase land for addition to the National Forest System, provided that such purchases were approved by the Commission and by the states in which they were made.

Wetlands - Any area that is more or less regularly wet or flooded. Where the water table stands at or above the land surface for at least part of the year.

Wild and Scenic Rivers Act - Declares that it is a policy of the United States that certain selected rivers which, with their immediate environments, possess outstanding scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values, shall be preserved for the benefit and enjoyment of present and future generations.

Wilderness - All National Forest lands included in the National Wilderness Preservation System; an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain.

Wilderness Recreation Opportunity (WOS) - The WOS concept is essentially a system for subdividing the wilderness into distinct management units, each of which can be perceived by both land managers and recreational users as possessing homogeneous landscape and social setting characteristics. This allows the manager to conceptralize his/her wilderness into more understandable and manageable smaller units. It also allows the option of developing more area specific direction which is supportive of the diversity of settings within wilderness. The four settings developed for the WOS concept are derivatives of the national ROS system and can be aggregated back to the ROS setting of either Primitive or Semi-primitive Nonmotorized. The four settings are:

1. Pristine (trailless)
2. Primitive
3. Semi-primitive
4. Transition

All four settings have objectives and standards which are within the legal mandates of the 1964 Wilderness Act and all subsequent additional statewide national legislation.

Wilderness Act - Establishes a National Wilderness Preservation System to be composed of Federally-owned areas designated by Congress, administered for use and enjoyment as Wilderness, the preservation of their wilderness character, and for the gathering and dissemination of information regarding their use and enjoyment as Wilderness.

Wildfire - Any fire on wild lands other than one intentionally set for management purposes and confined to a predetermined area.

Wildlife - All nondomesticated mammals, birds, reptiles, and amphibians living in a natural environment, including both game species and nongame species. Animals, or their progeny, which once were domesticated but escaped captivity and are running wild (i.e., feral animals), such as horses, burros, and hogs, are not considered wildlife.

Wildlife habitat diversity - The distribution and abundance of different plant and animal communities and species within a specific area.

Wildling - A naturally grown seedling (small tree).

Window - A critical segment of terrain through which rights-of-way could pass in traversing from points of origin to destination.

Withdrawal - An order removing specific land areas from availability for certain uses.

Woodland - Pinyon, juniper and oak forests usually growing on drier sites in the low elevations (less than 8,000 feet).

Z

Zoological-Botanical Area - A unit of land which has been designated by the Forest Service as containing outstanding or unique examples of fauna and/or flora. Areas of this type are identified and formally classified because of their recreational and educational values.

Appendix

A – Public Involvement

OVERVIEW

The public involvement process for the Coronado National Forest was begun in March, 1978. Public issues, management concerns, and opportunities have been combined into one list. Some were identified as issues and concerns in the regional planning process for the Southwest Region. Although some land and resource plans had been previously completed by the Coronado or were in the development process, the Coronado chose not to develop a list of preliminary issues and concerns. It was felt the public might be more open and candid about what they felt was bad or good about management of the Coronado National Forest, if they were not presented with a predetermined list.

General Public Contacts

Organizations were used as a primary means of contacting people to invite them to get involved in Forest Service planning. A search was made through southeastern Arizona to identify organizations. A letter inviting participation was sent to the 1002 organizations identified. Ten percent of the groups responded. Individuals who held Forest Service permits for grazing, special uses, etc. were added to the mailing lists along with individuals solicited through organization newsletter articles, newspaper stories, radio public service advertisements and organization mailing lists, for a total of 3200 people and organizations. An invitation to 12 public workshops held throughout southeastern Arizona during the Spring of 1978 was sent to names on the mailing list. The invitations included a response form enabling individuals unable to attend the meetings to make comments. Two hundred fifty three response forms and 745 letters were received. Almost five hundred people attended the workshops which were held in the following communities:

Community	Date	Persons in Attendance
Douglas, AZ	4-24-78	62
Willcox, AZ	4-26-78	20
Safford, AZ	4-28-78	28
Tucson, AZ	4-29-78	36
Portal, AZ	4-29-78	128
Arivaca, AZ	5-2-78	16
Nogales, AZ	5-2-78	18
Green Valley, AZ	5-3-78	14
Patagonia, AZ	5-3-78	32
Sierra Vista, AZ	5-4-78	50
Catalina, AZ	5-8-78	7
Tucson, AZ	5-9-78	79

Other Contacts

In addition to the general public contacts discussed above, the following specific agencies, governments and Indian Tribes were initially contacted to advise them of the planning effort and to identify any concerns they might have.

Name of Agency or Organization	Date Contact Made
Cities	
Bisbee	10/6/78
Douglas	10/6/78
Nogales	10/6/78
Oro Valley	10/6/78
Pima	10/6/78
Safford	10/6/78
South Tucson	10/6/78
Thatcher	10/6/78
Tucson	10/6/78
Willcox	10/6/78
Sierra Vista	10/6/78
Huachuca City	10/6/78
Counties	
Cochise	10/6/78
Graham	10/6/78

Counties (Continued)	
Hildalgo	10/6/78
Pima	10/6/78
Pinal	10/6/78
Santa Cruz	10/6/78
Agencies	
New Mexico Game & Fish Department	10/6/78
Bureau of Reclamation	10/6/78
BLM - State Office	10/6/78
National Park Service	10/6/78
Group:	
Saguaro N.M.	10/6/78
Coronado N.M.	10/6/78
Chiricahua N.M.	10/6/78
Tumacacori N.M.	10/6/78
AZ State Clearinghouse	10/6/78
AZ Bureau of Geology	10/6/78
& Mineral Technology	
AZ Cooperative Fishery	10/6/78
AZ Game & Fish Department	10/6/78
AZ Department of Transportation	10/6/78
AZ Land Department	10/6/78
AZ State Parks	10/6/78
Department of Health Services	10/6/78
AZ Outdoor Recreation	10/6/78
Coordination Committee	
US Fish & Wildlife Service	4/3/79
Government Councils	
PAG (Pima Association of	10/6/78
Governments)	
SEAGO (Southeast AZ Governments)	10/6/78
SWNMCOG (Southwest N.M. Council	10/6/78
of Governments)	
Indian Tribes	
Bureau of Indian Affairs	10/20/78
San Carlos Tribe	10/20/78
Papago Tribe	10/6/78
Military	
Davis Monthan AFB	10/6/78
Ft. Huachuca	10/6/78
Natural Resource	
Conservation Districts	
#743 Winkelman	10/6/78
#702 Gila Valley (Safford)	10/6/78
#709 Whitewater Draw	10/6/78
#715 Hereford	10/6/78
#712 Pima	10/6/78
#741 San Pedro	10/6/78
#744 Willcox-San Simon	10/6/78
#739 Reddington	10/6/78
Congressional Delegations	
Dennis DeConcini (U.S. Senate)	7/21/78
Morris K. Udall (U.S. House of	7/21/78
Representatives)	
Barry Goldwater (U.S. Senate)	7/21/78

As a follow-up to these initial and later contacts, the following agency plans were reviewed to determine coordination needs and management opportunities to be considered in the Coronado National Forest planning effort.

Action Plan, Arizona Department of Transportation. ADOT, May 1979.

AGF 1980a. Big Game Strategic Plans. 1980-1995. Arizona Game and Fish Department, Planning & Evaluation Branch.

AGF 1980b. Small Game Strategic Plans. 1980-1985 Arizona Game and Fish Department, Planning & Evaluation Branch. (Unpublished).

A Land Use Program for Arizona - Arizona Environmental Planning Commission, January, 1975.

Arizona Game and Fish Department Statewide Fish and Wildlife Plan, Arizona Game and Fish Department, 1976.

Arizona State Water Plan; Phase III, Arizona Water Commission, 1977.

BLM Wilderness Review, Arizona. Bureau of Land Management, Arizona State Office, November 1980.

Final General Management Plan, Coronado National Memorial, Arizona - U.S.D.I. Park Service, September 1976.

Identification of Areas within Arizona that do not Meet National Ambient Air Quality Standards. - Arizona Department of Health Services, August 1978.

Land Use and Policies, Mt. Lemmon Community Plan - Prepared for Pima County by University of Arizona, March 1979.

New Mexico Fish and Game Comprehensive Plan, Part II, Operation Section New Mexico Department of Game and Fish. (Unpublished) 1980.

Proposed Natural Areas in Arizona, A Summary - Natural Area Study Committee, Arizona Academy of Science, for Planning Division, OEPAD, Office of Governor, State of Arizona July 1976.

Statewide Comprehensive Outdoor Recreation Plan (SCORP) - Arizona Outdoor Recreation Coordinative Commission, Phoenix, Arizona December, 1977

The Comprehensive Plan, A Physical Development Guide For Eastern Pima County. Pima County, City of Tucson, City of South Tucson, Pima Association of Governments, Draft 1977.

ISSUE, CONCERN OPPORTUNITY DEVELOPMENT

Public comments from the 12 public workshops, written responses, the Huachuca unit public involvement process, the RARE II planning process and comments on the final EIS for the Santa Catalina Unit Plan were combined and analyzed using standard content analysis procedures. The packet of materials was sent to the Coronado National Forest technical workgroups. Their job was to read the publics' input and write issue statements, for their professional area. They were also to determine if the issues were long-range or short-range.

The numerous preliminary statements were read by an interdisciplinary team (ID team) composed of two people from each functional work group. The ID team checked for duplicates, combined statements and clarified them. These statements were categorized as Local/Regional/National and, as long-range or short-range. These statements were used by the Forest Supervisor and District Rangers to write issue statements which were to be dealt with in the Forest Land Management Planning Process.

The planning group again checked all public comments to make sure that topics mentioned in other contexts, such as a future goal, were part of the issue package.

In June 1978 the Forest Supervisor and the five District Rangers tentatively chose which issues should be dealt with in land management planning and which should be

handled in other ways. No attempt was made to prioritize issues. They were to be treated equally as to their consideration for resolution. Each issue was sorted according to the following criteria:

A. Land and Natural Resources
   1. Allocation (what and where)
   2. Management practices

B. Organizational Management
   1. Internal, including methods and techniques (i.e., how to)
   2. Interagency relationships
   3. External relationships (public)

C. Economics
   1. Cost effectiveness
   2. Constraints
   3. External effects (on community, etc.)

D. Legislative

The issues that fell into category "A" were to be the land management planning issues. The rest were called "Issues to be handled in other ways". The criteria that caused them to be so designated is shown in parentheses after the issue statement. They are grouped according to the way they were to be addressed.

LAND MANAGEMENT PLANNING ISSUES	
Fire	"The issue is, how much and what kind of (prescribed, man-caused, natural) fire should be allowed to burn, where, at what time of year, intensity, and how much private property/development protection should be provided."
Water	"The issue is, how the water produced on the Forest will be used."
Carrying Capacity	"The issue is, the need to establish carrying capacities (the number of people who can use an area while still protecting natural resources) and where they must be enforced."
Range	"The issue is, how much and where should Forest land be allocated for grazing and what relation does this bear to other uses (conflict between grazing and recreation), etc."
	"The issue is, the allocation of forage between grazing and wildlife."
Special Areas	"The issue is, where and how many utility corridors, commercial developments, access to inholdings, summer homes and apiary sites, etc., should there be."
	"The issue is, what areas should be designated as cultural and historic sites."
	"The issue is, the allocation of areas on the Coronado National Forest for research, or modification of management policies to enhance scientific research values."
Vegetation	"The issue is, where and how much vegetative manipulation should be done on the Coronado National Forest."
	"The issue is, how to allocate uses in riparian areas (e.g., fencing, grazing system)."
Law Enforcement	"The issue is, how much regulation and law enforcement and where."
Wilderness	"The issue is, how much wilderness and where it should be (after RARE II)."
	"The issue is, the difference in intensity of management in the different wilderness areas regarding recreation, wildlife, resources, grazing and fire management policies."

Recreation	"The issue is, where are the caves and to what kinds of uses should they be allocated and how can they be managed (recreation, scientific, wilderness)."
	"The issue is, where and how much land should be allocated for developed recreation (picnic/campgrounds) and which lands should remain undeveloped for dispersed recreation."
	"The issue is, where to provide for visual resource integrity."
Forest Products	"The issue is, to whom (citizen/non-citizen) and what type of (personal/commercial) forest products permits should be issued."
	"The issue is, which harvest techniques/silvicultural systems for wood (timber and fuelwood) should be used on the Coronado National Forest (clear cut, snag policy, reforestation, green/dead wood)."
	"The issue is, how much, where and for what objective should timber be harvested in the Forest."
	"The issue is, should Christmas tree sales be made and where."
Roads and Trails	"The issue is, the level of road and trail maintenance and standard for new roads and trails; where and how many (including signs)."
	"The issue is, how to resolve the conflicts between trail users (bikers, horseback, motorcycles)."
	"The issue is, what kind of and how much public access to special use areas."
	"The issue is, adequate (for peak periods of use), legal, public access to and within the Forest that is environmentally acceptable and safe (roads and trails, stock tank maintenance, fuelwood cutting, bird watching, hunting, etc.)."
Landownership	"The issue is, where and what kinds of land (private, state, etc.) should be acquired within the National Forest boundaries and which lands should be exchanged out of the National Forest System."
Wildlife	"The issue is, a question of allocation of time and effort to threatened species in relation to other flora and fauna."
	"The issue is, should other uses (mineral entry, recreation, etc.) be controlled in critical wildlife habitats."
	"The issue is, should Cave Creek be designated as a National Zoological Area or a wildlife management area, and how other uses should be integrated in the decision, or should it remain unclassified."
	"The issue is, where and how many fishing lakes should be in the Coronado National Forest?"
	"The issue is, how much and where should wildlife resources and habitat be maintained for future generations; which species (e.g., beargrass habitat-javelina)."
	"The issue is, where and how many areas should be designated as unique and critical wildlife habitats, research natural areas, and how they are to be managed."
	"The issue is, how much, where and why predator and rodent control should happen."
ISSUES TO BE HANDLED IN OTHER WAYS	
Study Plan for the Forest Land Management Plan	"The issue is, the confusion resulting from overlapping jurisdictions and authorities with different regulations and laws and different goals and objectives." (B)

	"The issue is, how to define the value of non-commodity resources, such as visual resource, recreation and wildlife (in economic terms)." (C)
Goals and Objectives in the Forest Land Management Plan	"The issue is, that people don't know what the Forest Service is doing and why, and they want to be informed." (B)
	"The issue is, whether or not consumptive use of renewable resource is done in an environmentally sound fashion." (B)
	"The issue is, how much of different uses should be produced, where and how it will affect the quality of the Forest in the future." (B)
	"The issue is, the amount of preservation that the Forest Service practices in its conservation (wise use) of natural resources." (B)
	"The issue is, the weight of input from the vested interests in land management decisions in relation to the weight of the input from non-vested interests (and vice versa)." (B)
	"The issue is, how to coordinate interagency cooperation in Cave Creek (trapping, lake development, etc.)" (B)
	"The issue is, how to give wildlife resources equal weight with other resources in land management planning and Forest Service decision making." (B) (C)
Individual/Project Analysis	"The issue is, whether or not to use herbicides." (B)
Annual Budgeting Process	"The issue is, what priority should be given to closing mine shafts for safety reasons (people and cows)." (B)
Law Enforcement Plan	"The issue is, uniform and consistent law and regulation enforcement in the Coronado National Forest." (B)
Inform and Involve Program	"The issue is, people frustration faced with multiple requirements for permits from different levels of government." (B)
	"The issue is, the amount and how basic environmental education is to be done within the Coronado National Forest, and by the Forest Service." (B)
	"The issue is, the lack of information about the effects of fire (wildlife, vegetation, the environment)." (B)
	"The issue is, how to improve communication between the Forest Service and Forest users." (B)
Would Require Legislative Change	"The issue is, the destructive mining practices as a result of the 1872 mining law." (D)
	"The issue is, what fees should be charged for recreational use." (D)
ADDITIONAL PUBLIC REVIEW	
Issue, Concerns, and Opportunities	This tentative list of Land Management Planning Issues selected by the Forest Supervisor and District Rangers was sent back to the public in June 1978 via "Forest Feedback", the planning newsletter. In an effort to get public feedback, a coupon was included in the newsletter for people to respond. Seventeen coupons were returned. The public pointed out two issues (water pollution or water quality and litter) which had indeed been left out of the adopted statements. The Coronado National Forest technical workgroups also reviewed the issues and added some management concerns of their own. In September 1978 the interdisciplinary team recommended a revised list of issues for forest planning. The final list was approved by the Supervisor and Rangers on September 19, 1978 and was published in

"Forest Feedback" during December 1978. No further public comments were received on the list of issues during that time.

Alternative Formulation

During the period March 12 to March 26, 1979, the Coronado National Forest held a series of workshops to involve the public in the formulation of alternatives. No new issues, concerns or opportunities were identified as a result of these workshops which were held in the following communities:

Community	Date	Persons in Attendance
Green Valley, AZ	3/12/79	24
Sierra Vista, AZ	3/12/79	47
Tucson, AZ	3/13/79	15
Patagonia, AZ	3/14/79	20
Willcox, AZ	3/15/79	11
Douglas, AZ	3/19/79	51
Apache, AZ	3/20/79	40
Safford, AZ	3/21/79	26
Tucson, AZ	3/22/79	30
Arivaca, AZ	3/26/79	9
Nogales, AZ	3/26/79	15

SELECTED ISSUES, CONCERNS AND OPPORTUNITIES

On March 30, 1981 the Regional Forester approved the list of issues to be addressed in the Forest Land Management Planning Process. Preceding each is a short background statement.

Recreation and Visual Quality

Recreation is a major use of the Coronado. Demand for all types is rapidly increasing. The Forest Service is unable to provide for all this demand, present and future.

As the local and tourist populations increase around the Coronado, it becomes apparent that the demand for Forest use will exceed supply in some categories.

"The issue is, the need to establish carrying capacities (the number of people who can use an area while still protecting natural resources) and where they must be enforced."

"The issue is, should the present Off Road Vehicle Plan be revised and how."

"The issue is, where and how much land should be allocated for development recreation (picnic/campgrounds) and which lands should remain undeveloped for dispersed recreation."

"The issue is, where are the caves and to what kinds of uses should they be allocated and how can they be managed (recreation, scientific, wilderness)."

"The issue is, how to provide for visual resource integrity."

Wilderness

Three areas have been designated by Congress as Wilderness. Five additional ones were recommended for wilderness as a result of RARE II. Seven areas still remain in question.

"The issue is, how much additional wilderness and where it should be (after RARE II)."

The various Wilderness are not equally accessible to people and have different attractions to offer.

"The issue is, the difference in intensity of management in the different wilderness areas regarding recreation, wildlife, resources, grazing and fire management policies."

Wildlife and Fish

The diversity of plants and animals found on the Coronado are probably unique in the entire National Forest System. Management is complex and even complicated more by the varied demands placed on the forest.

"The issue is, a question of allocation of time and effort to threatened species in relationship to other flora and fauna."

"The issue is, should other uses (mineral entry, recreation, etc.) be controlled in critical wildlife habitats."

"The issue is, should Cave Creek or the South Fork of Cave Creek be designated as a National Zoological Area or a wildlife management area, and how other uses should be integrated in the decision, or should it remain unclassified."

"The issue is, how much, where and why predator and rodent control should happen."

"The issue is, where and how many fishing lakes should be in the Coronado National Forest."

"The issue is, how much and where should wildlife resources and habitat be maintained for future generations; which species (e.g., beargrass habitat-javelina)."

"The issue is, where and how many areas should be designated as unique and critical wildlife habitats, research natural areas, and how they are to be managed."

"The issue is should we reintroduce native wildlife and/or plant species into suitable and/or historical habitats (includes threatened and endangered species)."

Range

Livestock grazing is a major use of the Coronado, however, as demand for other uses increases, there is potential for increased conflict between uses.

"The issue is, how much and where should Forest land be allocated for grazing and what relation does this bear to other uses (conflict between grazing and recreation),etc."

"The issue is, the allocation of forage between grazing and wildlife."

Timber and Firewood

Forest products, such as fuelwood, posts, poles, etc. are significant to some local users even though production is low compared to most other National Forests. Silvicultural techniques are one tool that can be used to meet various range, wildlife, watershed and recreation objectives.

"The issue is, to whom (citizen/non-citizen) and what type of (personal/commercial) forest products permits should be issued."

"The issue is, which harvest techniques/silvicultural systems for wood (timber and fuelwood) should be used on the Coronado National Forest (clear cut, snag policy, reforestation, green/dead wood)."

"The issue is, how much, where and for what objective should timber be harvested in the Forest."

"The issue is, should Christmas tree sales be made and where."

Diversity

The Coronado includes a wide diversity of vegetation. In the past it has been manipulated through fire control, grazing, road construction, etc. There is question about what additional changes should be made.

"The issue is, where and how much vegetative manipulation should be done on the Coronado National Forest."

"The issue is, whether or not to use non-native species for revegetation."

"The issue is, how to allocate uses in riparian areas (e.g., fencing, grazing system)."

Soil and Water

Competition for available water is rapidly increasing. Concerns have been expressed about the use, the quantity and quality of the water produced on the Forest.

"The issue is, how the water produced on the forest will be used, by whom, and what quality standards will be met."

The issue is, how should streams and lakes be classified as to use which implies the water quality standards they have to meet."

"The issue is, how much and where accelerated erosion should be tolerated."

Minerals

"The issue is, which areas should be withdrawn from mineral entry and which withdrawals should be restored."

Lands

While the Coronado is substantially solid blocks of federal land, there are places where lands would be better suited for private uses or where administration is more costly because of the ownership pattern. There are also places where private lands are really of a national forest character.

"The issue is, where and what kinds of land (private, state, etc.) should be acquired within the National Forest boundaries and which lands should be exchanged out of the National Forest System."

Special Areas

The pressure for development on Forest land is increasing either because private lands appear unsuitable or they are identified/used for more intensive uses.

"The issue is, where and how many utility corridors, commercial developments, access to inholdings, summer homes and apiary sites, etc., should there be."

"The issue is, the allocation of areas on the Coronado National Forest for research, or modification of management policies to enhance scientific research values."

Protection

Fire control has evolved into fire management on the Coronado National Forest. Many years of intensive control has resulted in a changed vegetation composition. There is increasing support for a more natural role of fire in the ecosystem and more use of fire as a tool to manipulate vegetation.

"The issue is, how much and what kind of (prescribed, man-caused, natural) fire should be allowed to burn, where, at what time of year, intensity, and how much private property/development protection should be provided."

Facilities (Roads Trails)

Access to Forest lands is becoming increasingly and restricted as development occurs around the Forest, and as users cause increased damage on adjacent lands. The Forest's transportation system has deteriorated over the past ten years while use has drastically increased.

"The issue is, the level of road and trail maintenance and standards for existing and new roads and trails; where and how many (Transportation Plans)."

"The issue is, how to resolve the conflicts between trail users (bikers, horseback, motorcycles)."

"The issue is, what kind of and how much public access to special use areas."

"The issue is, adequate (for peak periods of use), legal public access (roads and trails) to and within the Forest that is environmentally acceptable and safe roads and trails, stock tank maintenance, fuelwood cutting, bird watching, hunting, etc."

Law Enforcement

People look to the Coronado as a place to get away from it all, to relax in an unencumbered atmosphere. However, as uses increase, the conflict between users will increase.

"The issue is, how much regulation and law enforcement and where."

Cultural Resources

"The issue is, to what degree should archaeological and historical sites be interpreted to the public."

"The issue is, what archaeological and historical sites, should be nominated to the National Register of Historic Places."

MODIFICATION OF ORIGINAL ICO'S

During the period from 1978 to 1983, the Southwest Regional Guide was completed and the Coronado National Forest issued a Proposed Forest Plan and D.E.I.S based on the original issues. The following agencies, governments, and Indian Tribes were sent copies of the Proposed Forest Plan and Draft E.I.S. in December 1982.

FEDERAL AGENCIES:

Army Corps of Engineers
Bureau of Indian Affairs
Bureau of Land Management
  Arizona State Office
  New Mexico State Office
  Safford District
  Las Cruces District
Bureau of Mines
Department of the Army,
  Fort Huachuca
Department of the Interior
Environmental Protection Agency
  Washington
  San Francisco
  Dallas
National Park Service
  Chiricahua National Monument
  Coronado National Memorial
  Saguaro National Monument
  Western Archaeological Center
U.S. Fish and Wildlife Service
U.S.D.A. Forest Service

STATE AGENCIES, NEW MEXICO:

New Mexico Department of Agriculture*
New Mexico Department of Commerce and Industry*
New Mexico Department of Energy and Minerals*
New Mexico Department of Finance and Administration
  State Planning Division*
  Historic Preservation Bureau*
New Mexico Department of Health and Environment
  Environmental Improvement Division*
New Mexico Department of Natural Resources
  Administrative Services Division*
  Game and Fish Division*
  State Forestry Division*
New Mexico State Land Office*

* Contacted through the New Mexico Clearinghouse, Department of Finance and Administration.

STATE AGENCIES, ARIZONA:

Agriculture and Horticulture Commission*
Arizona Office of Tourism
Arizona State Land Department
  Phoenix Office*
  Tucson Office
Arizona Department of Transportation*
Arizona Department of Water Resources*
Arizona Bureau of Air Quality*
Arizona Game and Fish Department
  Phoenix Office*
  Tucson Office
Arizona Department of Mineral Resources

STATE AGENCIES, ARIZONA: (Continued)

Arizona State Parks*
Arizona Office of Economic Planning and Development
Arizona Division of Natural Resource Conservation
Arizona Natural Heritage Program*

* Contacted through the Arizona State Clearinghouse, Office of Economic Planning and Development

COUNTY GOVERNMENTS, ARIZONA:

County Boards of Supervisors of following Counties:
Cochise
Graham
Greenlee
Pima
Pinal
Santa Cruz

County Cooperative Extension Service Offices in:
Cochise County
Graham County
Pima County
Pinal County
Santa Cruz County

Pima County Assessor's Office
Pima County Department of Transportation and Flood Control
Pima County Parks and Recreation Department
Pima County Planning Department

COUNTY GOVERNMENTS, NEW MEXICO:

County Boards of Supervisors of following Counties:
Hidalgo
Grant
Luna

Hidalgo County Cooperative Extension Service

INDIAN GROUPS

San Carlos Apache Tribal Council
Papago Tribal Council

LOCAL GOVERNMENTS IN THE FOLLOWING COMMUNITIES:

Arizona:

Arivaca
Benson
Bisbee
Bowie
Douglas
Green Valley
Mammoth
Marana
McNeal
Nogales
Oracle
Oro Valley
Patagonia
Pima
Safford
San Carlos
San Manuel
Douglas
Sierra Vista
St. David
Sonoita
South Tucson
Summerhaven
Thatcher
Tombstone
Tucson
Willcox

LOCAL GOVERNMENTS IN THE FOLLOWING COMMUNITIES: (Continued)

New Mexico:

Animas
Lordsburg
Rodeo

CONGRESSIONAL DELEGATIONS:

Arizona

Hon. Barry Goldwater
Hon. Dennis De Concini
Hon. John J. Rhodes
Hon. Bob Stump
Hon. Eldon Rudd
Hon. Morris K. Udall

New Mexico

Hon. Pete Domenici
Hon. Harrison Schmitt
Hon. Manuel Lujan
Hon. Joe Skeen

Over 2500 responses were received from individuals, organizations, agencies and governments. External and internal comments received during the development and review of these documents, substantiated many of the original ICOs, caused some to be modified and some to be added. The modified list is shown in Chapter 1 of the D.E.I.S.

Direction from the Secretary of Agriculture prompted another public involvement phase relative to the wilderness issue and the re-evaluation of roadless areas. During August, 1983, statewide and local meetings were held on various Arizona National Forests. By conclusion of the comment period on September 30, 1983, many responses had been received relative to the roadless area re-evaluation. These substantiated and refined the I.C.O.s for roadless areas and were used during the development of the Arizona Wilderness Bill (PL98-406) as well as alternative development for resolution of the three wilderness study areas.

TREATMENT OF ICOs IN ALTERNATIVES

Most issues (planning questions) were treated differently in all alternatives. This difference is reflected in the variation of certain outputs and management intensity from one alternative to another as a result of varying prescriptions.

The following goals and objectives (Table 1) were established to provide a measure for estimating the degree of issue resolution in each alternative.

Table 3 in Chapter 2 of the D.E.I.S. summarizes the individual issue resolution by alternative.

Table 1: Goals and Objectives to Resolve Major Issues

Issue	Unit of Measure	Demand Expressed by Regional Guide	Demand Expressed by Issues & Concerns	Maximum Supply Limit by Year 2025	1981 Status
Recreation opportunity and diversity					
Developed use	Thousand RVD	2655 by Year 2025	25 to 50% increase	2,715	1,181
Developed areas	Acres	NA	NA	6,740	3,990
Nongame use	Thousand RVD	56 by Year 2025	192(State wildlife goal by Yr.2030)	226	81
Hunting & Fishing use	Thousand RVD	158 by Year 2025	549(State wildlife goal by Yr.2030)	489	236
Other wilderness use	Thousand RVD	180 by Year 2025	Dependent on wilderness acres	813	123
Other dispersed	Thousand RVD	731 by Year 2025	NA	1,888	766
Off road vehicle use	Percent of Forest by classifications	NA	Varies depending on special interest.	Depends on availability and suitability by alternative	
	Open				63%
	Restricted				21%
	Closed				16%
Wilderness system	Total acres in system	NA	Varies from none to all wilderness study areas (90,800 acres)	429,990	339,190
	Number of Areas	NA	(3 areas)	11	8
Wildlife resource management	Acres of habitat improved annually	4,200	Forest should increase emphasis on wildlife resources. Also see wildlife related RVD goals	NA	7,966
Range management:					
Allocation of forage to livestock grazing	Thousand AUM of capacity	NA	Varies depending on special interest	408	326
Balance of use with capacity	Thousand AUM of permitted use	449 by Year 2025	Balance use with capacity. Time frame varies by special interest.	408	399
Riparian area management	Acres in acceptable ecological condition	All areas in satisfactory or better condition by Year 2030. 25% in satisfactory condition by Year 2000.	All areas in acceptable	36,807	1)

Table 1 - Goals and Objectives to Resolve Major Issues (Continued)

Issue	Unit of Measure	Demand Expressed by Regional Guide	Demand Expressed by Issues & Concerns	Maximum Supply Limit by Year 2025	1981 Status
Fuelwood availability and harvest intensity	Thousand cubic feet	NA	Demand for hardwood species far exceeds supply. 1980 harvest was 16,000 cords. Need to develop market for softwood species from excess timber.	250 (2,900 cords)	408 (4800 cords)
Timber harvest intensity	Thousand cubic feet	0	Maintain harvest level to at least equal local mill capacity of 91 MCF (445 MBF).	798 (3990 MBF)	499 (2495 MBF)
Special land allocation:					
Research natural areas	Number of areas	Possible ecosystems identified.	4 additions suggested	NA	6
Zoological botanical	Number of areas	0	9 suggested	NA	0
Watershed condition	Watersheds in satisfactory or better condition	All watersheds to satisfactory or better condition by Year 2020.	All watersheds in satisfactory or better condition	21	13

Footnotes:

1) Inventory under way to classify areas and determine condition.

B – Description of Analysis Process

INTRODUCTION

Appendix B describes the analysis process used in developing the range of alternatives discussed in Chapter 2 of this Environmental Impact Statement.

The Forest and Rangeland Renewable Resources Planning Act (RPA) of 1974, as amended by the National Forest Management Act (NFMA) of 1976 mandates preparation of National Forest System Land and Resource Management Plans. These plans are to provide for multiple use and sustained yield of goods and services from the National Forest System in a way that is sensitive to economic efficiency and maximizes long-term net public benefits in an environmentally sound manner [36 CFR 219.1(a) and (b)]. Regulations for implementing the procedural provisions of the National Environmental Policy Act (NEPA) of 1969 require that all reasonable alternatives, including the Proposed Action, be vigorously explored and objectively evaluated [40 CFR 1502.14].

In order to meet these requirements, the Forest undertook a quantitative analysis incorporating economics into the process.

The purpose of this analysis is three-fold: First, it assures that each alternative contained the most cost-efficient combination of management practices which met the objectives of that alternative. Second, it provided a means to evaluate or compare alternatives for the purpose of choosing among them. Third, it allowed a quantitative starting point from which non-monetary values can be related and discussed.

Forest planning is a detailed analysis process. It is necessary to analyze the interrelationships between renewable and nonrenewable resources, economic trends, and the social aspects of distributing resources and services to society. The goal is to select the most economically efficient combination of management prescriptions that would achieve a given set of priced and nonpriced goals and objectives from the thousands of possible combinations of management prescriptions which could be applied throughout the Forest.

Computer modeling is an analytic technique designed to overcome the complexity of keeping track of the resulting resource outputs, environmental consequences, costs, benefits, and activity schedules applied to the land. This phase of the process is a tool for the manager to use in making a decision. Based on professional judgement and experience, adjustments in resource distribution are appropriate in order to satisfy implicit social-political implications, or intangible resource considerations which are not inherent in a mathematical model.

Requirements to be fulfilled in the planning process are described in [36 CFR 219.12]. A brief discussion of the steps used on the Coronado National Forest to complete the planning actions is described below.

Identification of Purpose and Need

Public issues, management concerns, and resource use and development opportunities were identified through public participation activities and coordination with other Federal agencies, State and local governments, and Indian tribes. The development of issues, concerns, and opportunities is described in detail in Appendix A.

Planning Criteria

Planning criteria guided the planning process through: 1) Identification of the kind and detail of resource inventories needed; 2) the development of benchmark runs for determining minimum and maximum levels of resource opportunities (decision space) responsive to issues, concerns and opportunities; 3) the formulation and evaluation of alternatives responsive to resolving issues, concerns, and opportunities; and 4) insuring net public benefits were maximized.

Inventory Data and Information Collection

Individual resource inventories were used to identify site specific areas having common environmental characteristics. Data was collected and stored in the Forest resource data base consistent with the available information and the level of detail needed.

Analysis of the Management Situation

The Analysis of the Management Situation (AMS) is a determination of the need to change management direction and of the ability of the Forest to supply goods and services in response to society's demands. The primary purpose for this analysis is to provide a basis for formulating a broad range of reasonable alternatives responsive to I.C.O.'s. During development of the AMS, benchmark runs with single resource emphasis were developed to define the Forest capability to supply various renewable resources on the Forest. Benchmarks were also developed to determine the most cost effective means of managing the Forest.

Formulation of Alternatives

Formulation of alternatives is described in Chapter 2. The primary objective is to provide an adequate basis for identifying the alternative that comes nearest to maximizing net public benefits, consistent with resource integration and management requirements of [36 CFR 219.13 and 219.27].

The physical, biological, economic, and social effects of implementing each alternative considered in detail, provide the analytic basis for comparison of alternatives. This is presented in detail in Chapter 4. Chapter 2 presents the major environmental impacts in comparative form in a manner which shows the major differences between the Proposed Action and other alternatives to provide a clear basis for decision-making.

INVENTORY DATA

The following discussion presents concepts on how resource data was utilized to delineate capability areas, stratify the Forest into analysis areas based on suitability for management practices, and to determine production (resource opportunity) coefficients.

Capability areas are unique areas of land with respect to slope, landform, vegetation and soils. They form the basic unit for cataloging inventory data.

Analysis areas are aggregations of capability areas, not necessarily contiguous, which are similar with respect to existing vegetation, slope and legal/administrative status. These areas provide the framework for analysis, because individually they respond in a like manner to specific management prescriptions.

Production coefficients reflect the number of units per acre of a given resource that can be produced over a specific period of time. These coefficients were estimated by resource specialists using latest research findings, simulation models, literature reviews, field observations, and professional experience.

The expected value of the coefficient is assumed by the model to be known with certainty. This is required to reduce the complexity and magnitude of the modeling problem to manageable proportions. The variability in the real world is greater than what is shown in the model, but it is difficult to model the range of all variables and the probability of occurrence for each possible value in this range.

The development of alternatives is directly related to the ability of the Forest to supply resource outputs (opportunities) based on land capability determination. The mix of specific outputs in an alternative varies with the level of investment and the management emphasis applied to a specific analysis area.

Projected outputs over the planning horizon are based on the best scientific information available. Monitoring the implementation of an alternative is designed to confirm those projections or identify additional inventory needs, or identify needed changes in application of management prescriptions.

Simulation models used in the analysis process include:

- ECOSIM. This model computes timber yield tables for a wide range of stand densities and management controls. The reader is referred to ECOSIM: A System for Projecting Multiresource Outputs Under Alternative Forest Management Regimes by James J. Rogers, Joe Prosser, Lawrence D. Garrett, and

Michael G. Ryan. Administrative Report, Rocky Mountain Forest and Range Experiment Station, USDA Forest Service, Ft. Collins, Colorado, October, 1984.

- IMPLAN. This model was used to analyze economic impacts based on resource outputs. For further information see:

- IMPLAN User's Manual. Systems Application Unit for Land Management Planning, Forest Service, USDA. August 1982.

FORPLAN This is the Forest Planning Model. Underlying the FORPLAN model is a mathematical technique known as linear programming. For a more detailed understanding of aspects of linear programming and FORPLAN, the reader is referred to:

- Forest Service Land Management Planner's Introduction to Linear Programming by Brian Kent, USDA Forest Service Systems Application Unit for Land Management Planning, Fort Collins, Colorado. U.S. Government Printing Office: 1980-777-792/131, Region No. 8.

- Forest Planning Model (FORPLAN) User's Guide and Operations Manual by K. Norman Johnson, Daniel B. Jones, and Brian M. Kent, USDA Forest Service, Fort Collins, Colorado. May 1, 1980.

Sources of data include Forest Service inventories and records, other Federal and State records, and scientific research findings.

OVERVIEW OF THE FOREST PLANNING MODEL

This section of Appendix B presents the basic concepts used in the Forest Planning Model. Specific details related to these components, and development of alternatives are presented in more detail in other sections of this appendix.

Minimum Level

During the identification of analysis areas, estimates were made by resource specialists of naturally occurring outputs that are provided without direct management actions and associated costs. Output levels for water yield, dispersed and wildlife related recreation use, and livestock grazing capacity were estimated. Other resource opportunities are nonexistent. This minimum level of management provides for protection of soil and water resources, productivity of the land, life, health and safety of incidental users, and prevention of environmental damage to adjoining lands or downstream areas. This level of analysis is done outside the computer model and sets a base line for comparing alternatives to naturally occurring outputs.

The resource allocation model used in developing the Forest Plan is called FORPLAN (Johnson, K.N., et al 1980). FORPLAN is a linear programming model that simultaneously distributes specific land areas to individual management prescriptions, and schedules activities to achieve a specified set of objectives within certain constraints. Variables that are accounted for by the model include resource outputs, costs, benefits, and implementation practices. The Coronado National Forest used Version I of FORPLAN. The major components of the model are as follows:

Outputs (opportunities)

Outputs are an array of goods and services capable of being produced through management of National Forest lands. Measures of outputs are dependent on the product produced. They may or may not have a market value. The quantity of a specific output is dependent on the management emphasis (prescription) applied to a given area of land (analysis area). Outputs tracked and estimated in this planning effort are shown in the Coefficient Development Section of this Appendix.

Activities

Activities are specific management actions relative to managing the Forest and producing goods and services (outputs).

Activities that normally are used together to produce a desired effect were grouped into management practices. For example, the operation and maintenance of recreation sites is a management practice consisting of several activities or actions. For a listing of activities and management practices used, see the Prescription Development Section of this Appendix. Each management practice was assigned a cost depending of the type of land (analysis area) to which it was applied and the particular standards and guidelines for implementing the practice.

Analysis Areas

As part of the planning process, the Forest assesses the current condition of its resources, determines the potential to produce a variety of goods and services, and predicts how the land will respond to a variety of management choices. Because of the complexity of predicting the Forest's widely varying response to different types and intensities of management, the Forest was subdivided into analysis areas based on variations in biological, physical, economic and social conditions.

Analysis areas are aggregations of acres, not necessarily contiguous, which are similar with respect to existing vegetation, slope, and legal/administrative status. One hundred fifty-three (153) analysis areas were included in the model. Refer to Analysis Area Development section of this appendix for a complete listing of analysis area identifiers. A complete listing of analysis areas and descriptions is available at the Coronado Forest Supervisor's Office.

Management Prescriptions

A prescription is the set of assigned management practices (activities) and a schedule of application to achieve a desired quantity of goods and services, and environmental effects. Each prescription consists of standards and guidelines directing implementation of the prescription as well as resource production coefficients, costs, and scheduling options associated with the prescription.

A wide range of prescriptions was developed to meet legal requirements and to address public issues, management concerns, and opportunities developed early in the planning process. Prescriptions ranged from minimum to maximum production of the various goods and services.

The FORPLAN model distributed prescriptions to specific analysis areas while maximizing economic efficiency expressed by present net value and based on constraints used to meet goals and objectives of benchmarks or alternatives.

Prescription distributions were verified by determining if the prescription could be implemented in the analysis areas, and if the outputs, costs, environmental effects, and standards and guidelines were realistic for the Forest.

Prescriptions were developed by combining the least-cost management practices needed to achieve the objectives of a prescription. Cost efficiency was considered in developing prescriptions based on professional experience, and review of current literature and research findings by the Interdisciplinary Team.

Refer to Prescription Development section of this Appendix for a further description of prescriptions. A detailed listing of prescriptions by analysis areas is on file at the Forest Supervisor's Office.

Planning Horizon

The planning horizon for the analysis is 100 years. Application of a prescription to an analysis area results in outputs and costs calculated in the model based on the coefficients for each time period within the planning horizon. The planning horizon is divided into ten time periods. Each one of the time periods is ten years in length.

Constraints

Constraints are quantifiable limits placed on the model to control the level and mix of outputs and effects and to meet the objectives of each alternative.

In linear programming analysis, constraints override the objective function. Thus, if a predetermined level of outputs or minimum physical condition is entered as a constraint, it is always achieved or no feasible solution is found.

The following types of constraints were used during the formulation and evaluation of alternatives:

- Output Constraints - These are used to produce a specified amount of any resource, such as timber, livestock forage, or recreation.

- Budget Constraints - These are limitations on budgets for implementing the range of available prescriptions to insure financial feasibility.

- Prescription Constraints - These are limitations on the specific acreage or land area applied to a specific prescription.

- Non-declining Timber Yield - This is a requirement that the net merchantable cubic timber volume harvested in each period is greater than or equal to the volume harvested in the preceding time period.

- Ending Inventory - This maintains perpetual timber harvest. The inventory at the end of the planning horizon (net MCF) must be greater than or equal to the average inventory of the regenerated stands in the long run [36 CFR 219.16(a)(1)].

- Long Run Sustained Yield Link - This is a requirement that the net merchantable timber volume harvested (MCF) in the last period is less than or equal to long run sustained yield [36 CFR 219.16(a)(1)].

- Culmination of Mean Annual Increment - This is a requirement that the total yield from regenerated stands at harvest age is equal to or greater than 95-percent of the volume production corresponding to CMAI, as expressed in cubic measure [36 CFR 219.16(a)(2)(iii)]

The yield coefficients for timber used in FORPLAN were derived from the results of the "ECOSIM" models. The timber harvest requirements above are incorporated within the yield coefficients and are not achieved through application of specific constraints to the model.

Specific constraints used for each benchmark and alternative are described in the Benchmark Analysis and Alternative Sections of this Appendix.

Coefficients

A coefficient is a numerical quantification of the value of an output, the cost of a management prescription or amount of an output at a given point in time. Output and cost coefficients were developed by resource specialists on the Interdisciplinary Team. Output coefficients reflect the number of units per acre that can be produced over a specific period of time. These coefficients were based on either a simulation model or other data sources. Output coefficients were developed for sawtimber, fuelwood, permitted livestock use, grazing capacity, developed recreation, dispersed recreation, wilderness recreation, wildlife recreation, and soil loss. Water yield coefficients were also developed, but not entered into the FORPLAN Model.

Costs were estimated using Forest budget data from Fiscal Years 1980 & 1981. Costs include all resource practices and activities involved in a specific prescription. All cost data used in the model represents 1980 fourth quarter dollars.

Benefits were assigned based on 1985 Resource Planning Act (RPA) values. Recreation opportunity benefits were modified to represent the mix of opportunities available on the Coronado.

Refer to the Coefficients section of this appendix for the calculations and assumptions used to develop coefficients. A detailed listing of coefficients by prescriptions is on file in the Forest Supervisor's Office.

Objective Function

Objective functions are mathematical expressions of the criteria by which the model assigns land and resources (analysis areas) to various prescriptions. These can be either economic (e.g., maximize present net value for 100 years) or physical (e.g., maximize developed recreation for 100 years). All alternatives were developed using maximize present net value over 100 years as the objective function. Certain benchmarks maximized timber, range capacity, recreation, wildlife, and wilderness outputs prior to maximizing present net value.

PRESCRIPTION DEVELOPMENT

Prescriptions were developed through an Interdisciplinary (ID) approach using resource specialists with expertise covering all resource areas on the Forest.

Prescription development was based on all available data sources including field experience, literature reviews, research findings, and simulation models.

Standards and guidelines for all activities or potential activities occurring in each analysis area were developed by resource specialists according to their specific area of knowledge. In order to ensure specific minimum management re-

quirements were met [36 CFR 219.27], standards and guidelines were developed to reflect integration of resources in the development of specific management prescriptions. This was accomplished through interaction between resource specialists and through development and review of management prescriptions by District Rangers and Primary Staff Officers.

Prescription development followed a philosophy of building a broad range of management prescriptions to ensure appropriate consideration of the outputs and uses which lands are capable of providing, and building management intensity from low to integrated multi-management and unconstrained resource maximums.

Many prescriptions were developed. Some portray current management practices, while others portray practices needed to meet the minimum legal requirements associated with public land management. Some prescriptions maximize production of individual resources; some are more responsive to specific issues or concerns; and others apply to land requiring specialized management. All prescriptions included implementation timing for each activity.

Each management prescription was assigned quantities of resource output production by resource category and analysis area.

Costs varied by individual resource management practices within each prescription as applied to appropriate analysis areas. Resource values (benefits) were assigned for all prescriptions by resource category. Recreation benefits varied depending on the management intensity.

The following elements are common to all prescriptions:

A description of the multi-resource activities which will be carried out.

A description of the timing and intensity of the planned activities.

A statement of specific policies which apply to the uses and activities covered by the prescription.

Standards and guidelines for resource protection and use.

Mitigation measures and coordinating requirements needed to protect resources and the environment.

The prescriptions which were used in benchmark and alternative analysis are shown in Appendix C. Appendix C also summarizes the management emphasis and intensity.

Management prescriptions available by analysis area and complete details on the standards and guidelines contained in management prescriptions are on file at the Forest Supervisor's Office.

ANALYSIS AREA DEVELOPMENT

Analysis areas are the basic land areas to which management prescriptions are applied to produce resource opportunities (outputs) and environmental effects. Their delineation is based on the level of analysis needed to address the issues, concerns, and management opportunities identified early in the planning process. Two names are attached to each analysis area in FORPLAN. The first name is called "level 1." The second is called "level 2." These two levels correspond to the criteria that were used to define the analysis areas.

Two criteria were considered during the development of analysis areas:

1) The capability and suitability of the land to produce various resources. This is expressed in the capability or terrestrial ecosystem types that were developed to delineate capability areas. These were assigned as level two identifiers in FORPLAN. These capability types are listed and defined in Table 1.

2) The availability of the land to produce or sustain various resources. These broad areas represent management implications that now affect or may in the

future affect the production of outputs. These were assigned as level one identifiers in FORPLAN. These are listed and defined in Table 2.

The resulting combinations of these two criteria led to the 153 different analysis areas as used in the FORPLAN model.

Table 1. Definition of Capability Area Types (CA)

CA Type Code (FORPLAN Code)	Vegetative Type	Land Form Modifier
1 P	Southwestern Desertscrub	Plains
1 H/M	Southwestern Desertscrub	Hills and Mountains
1 M	Southwestern Desertscrub	Mountains
2 P	Desert Grassland	Plains
2 P/H	Desert Grassland	Plains and Hills
3 P	Plains Grassland	Plains
4 M	Mountain Grassland	Mountains
5 H	Chaparral	Hills
5 H/M	Chaparral	Hills and Mountains
6 P	Broadleaf Woodland	Plains
6 P/H	Broadleaf Woodland	Plains and Hills
6 H/M	Broadleaf Woodland	Hills and Mountains
6 M	Broadleaf Woodland	Mountains
6 P/S	Broadleaf Woodland	Plains Savannah
7 P	Coniferous Woodland	Plains
7 P/H	Coniferous Woodland	Plains and Hills
7 H/M	Coniferous Woodland	Hills and Mountains
7 M	Coniferous Woodland	Mountains
8 M	Deciduous Forest	Mountains
9 A H/M	Coniferous Forest Pine-Oak Juniper	Hills and Mountains
9 B H/M	Coniferous Forest Ponderosa Pine	Hills and Mountains
9 C H/M	Coniferous Forest Douglas Fir-Pine	Hills and Mountains
9 D H/M	Coniferous Forest Spruce-Fir	Hills and Mountains
10 R	Dry Desert Riparian	
11 AR	Wet Deciduous Riparian	
11 BR	Dry Oak Riparian	
12 R	Wet Coniferous Riparian	

Narrative Description of Capability Area Types as Applied to the Coronado National Forest.

The 1P terrestrial ecosystem is characterized by nearly level to moderately sloping alluvial fans and piedmont plains (sometimes severly dissected) at elevations of about 2,100 to 4,900 feet. Dominant slopes range from 1 to 15 percent. The climate is steppe (hot). Mean annual air temperature ranges from about 62° to 72° F. Mean annual precipitation ranges from about 8 to 11 inches which comes as gentle rains in winter and high intensity localized thunderstorms in summer. The dominant native vegetation is saguaro, palo verde, creosote bush, ocotillo, mesquite, catclaw, and brittle bush. The foothills and plains below the Catalina Mountains are a good example of 1P.

The 1H/M terrestrial ecosystem is characterized by moderately sloping to steep hills and rough mountain slopes at elevations of about 3,000 to 5,100 feet. Dominant slopes range from 25 to 40 percent. 1H/M is otherwise similar to 1P. The footslopes of the front range of the Catalina Mountains are typical of 1H/M.

The 1M terrestrial ecosystem is characterized by moderately steep to steep rough mountain slopes at elevations of about 3,000 to 5,500 feet. Dominant slopes are 40 to 60 percent. 1M is otherwise similar to 1P. The mountain slopes of the front range of the Catalina Mountains are typical of 1M.

The 2P terrestrial ecosystem is characterized by nearly level to moderately sloping alluvial fans and piedmont plains at elevations of about 3,500 to 5,500 feet. Dominant slopes range from 1 to 15 percent. The climate is steppe (hot). Mean annual air temperature ranges from about 59° to 70° F. Mean annual precipitation ranges from about 11 to 14 inches which comes as gentle rains in winter and high intensity localized thunderstorms in summer. The dominant native vegetation are grasses including, but not necessarily limited to, bush muhly, cane beardgrass, Texas bluestem, tobosa in limited areas, curly mesquite, black, sideoats, and hairy gramas. Incidental to major overstory amounts of mesquite also occur. The exotic Lehmans lovegrass also is common. The mesquite grassland type seen from I-19 between Tucson and Nogales is typical of 2P.

The 2P/H terrestrial ecosystem is characterized by a complex of gently sloping to moderately steep hills and valley plains at elevations of about 3,500 to 5,500 feet. Dominant slopes range from 5 to 40 percent. 2 P/H is otherwise similar to 2P. A good example of 2 P/H can be seen from I-19 between Tucson and Nogales.

The 3P terrestrial ecosystem is characterized by grassed level to moderately sloping alluvial fans, valley and piedmont plains, tableland, and interspersed moderately sloping low hills at elevations of about 5,000 to 5,500 feet. Dominant slopes range from 1 to 15 percent with hills ranging up to 25 percent. The climate is humid subtropical. Mean annual air temperature ranges from about 56° to 64° F. Mean annual precipitation ranges from about 14 to 18 inches which comes as gentle rains in winter and high intensity localized thunderstorms in summer. The dominant vegetation is plains lovegrass, curly mesquite, vine mesquite, cane beardgrass, and hairy sideoats, little bluestem, and blue grama. The exotic weeping lovegrass commonly occurs. The valley plains (the main drainage ways) may have an overstory of emory oak. The grassland of the San Rafael Valley is typical of 3P.

4M is characterized by level to gently sloping basins and valley plains at elevations above 7,500 feet. Dominant slopes range from 0 to 5 percent. The climate is temperate continental. Mean annual air temperature ranges from 45° to 50° F. Mean annual precipitation ranges from about 24 to 30 inches which comes as snow in winter and thunderstorms in the summer. The dominant native vegetation is wheatgrass species, long tongue muhly, deer grass, bullgrass, pine drop seed, june grass, and sedge species. The open meadow area just below Rustler Park in the Chiricahuas is a good example of 4M.

5H is characterized by moderately sloping to moderately steep hills at elevations of about 4,800 to 5,500 feet. Dominant slopes range from 15 to 40 percent. The climate is humid subtropical. The temperature ranges from 52° to 58° F. Mean annual precipitation ranges from 16 to 21 inches which comes as gentle rains and some snow in winter, and high intensity localized thunderstorms in summer. The dominant native vegetation is mountain mahogany, desert ceanothus, manzanita, toumey, emory, silver leaf, and Arizona white oak and a scattering of Chihuahua, pinyon, and ponderosa pine. Turbinella oak may also be present. Much of the Santa Teresa Mountains have good examples of 5H.

5H/M is characterize by a complex of moderately sloping to steep hills and mountains at elevations of about 4,800 to 6,300 feet. Dominant slopes range from 25 to over 60 percent. 5H/M is otherwise similar to 5H. Much of the Santa Teresa Mountains are typical of 5H/M.

6P/S is characterized by nearly level to moderately steep sided tableland and piedmont plains at elevations of about 5,000 to 5,400 feet. Dominant slopes are 1 to 35 percent. The climate is humid subtropical. Mean annual air temperature ranges from 57° to 65° F. Mean annual precipitation ranges from about 14 to 18 inches which comes as low intensity rains in winter and high intensity localized thunderstorms in summer. The dominant native vegetation is characteristic of an oak savannah which is what 6P/S is. Tree canopy cover is less than 5 percent. Grasses include plains lovegrass, curly mesquite, vine mesquite, little bluestem, cane beardgrass, hairy sideoats, and blue grama. The area north of the Mexico border to the Canelo Hills and Huachuca Mountains are good examples of 6P/S.

6P is characterized by nearly level to moderately sloping alluvial fans and piedmont plains at elevations of about 4,800 to 5,400 feet. Dominant slopes range from 1 to 15 percent. The climate is humid subtropical. Mean annual air temperature ranges from about 52° to 58° F. Mean annual precipitation ranges from about 16 to 19 inches which comes as low intensity rains in winter and high intensity localized thunderstorms in summer. The dominant native vegetation is emory and Arizona white oak, alligator juniper, manzanita, and Juniperus Erythrocarpa. The flat wooded areas surrounding the San Rafael Valley are typical of 6P.

6P/H is characterized by a complex of gently sloping to moderately steep hills and piedmont plains at elevations of about 4,800 to 5,800 feet. Dominant slopes range from about 5 to 35 percent. 6P/H is otherwise similar to 6P. Much of the Canelo Hills area is representative of 6P/H.

6H/M is characterized by moderately sloping to moderately steep hills and mountains at elevations of about 4,800 to 6,300 feet. Dominant slopes are 25 to 40 percent. Good examples of 6H/M are found in any of the more mountainous oak types on the Coronado.

6M is characterized by moderately steep to steep mountains at elevations of about 5,000 to 6,300 feet. Dominant slopes are 40 to over 60 percent. Good examples of 6M are found in almost all of the Coronado's mountain ranges.

7P is characterized by nearly level to moderately sloping alluvial fans and piedmont plains at elevations of about 5,000 to 6,000 feet. Dominant slopes range from 1 to 15 percent. The climate is humid subtropical. Mean annual air temperature ranges from about 50° to 58° F. Mean annual precipitation ranges from about 17 to 22 inches which comes as gentle rains and snow in winter and high intensity localized thunderstorms in summer. The dominant native vegetation is pinyon pine (mostly Mexican), alligator juniper, Arizona white oak, emory oak, and may have some Chihuahua pine.

7P/H is characterized by a complex of gently sloping to moderately steep hills and valley plains at elevations of about 5,000 to 6,200 feet. Dominant slopes range from 5 to 40 percent. 7P/M is otherwise similar to 7P.

7H/M is characterized by moderately sloping to moderately steep hills and rough mountain slopes at elevations of about 5,500 to 7,000 feet. Dominant slopes range from 25 to 40 percent. 7H/M is otherwise similar to 7P.

7M is characterized by moderately steep to steep rough mountain slopes at elevations of about 6,000 to 7,000 feet. Dominant slopes are 40 to 60 percent. 7M is otherwise similar to 7P.

8M is characterized by moderately sloping to moderately steep or steeper canyons and mountain slopes at elevations of about 7,500 to 9,300 feet. Dominant slopes are 15 to 40 percent. The climate is temperate continental. Mean annual air temperature ranges from about 44° to 50° F. Mean annual precipitation ranges from about 26 to 32 inches which comes as gentle rains and perhaps heavy snows in winter and high intensity localized thunderstorms in summer. The dominant native vegetation is aspen, Rocky Mountain maple, box elder, ash, and New Mexican locust.

9AH/M is characterized by moderately sloping to moderately steep hills and rough mountain slopes at elevations of about 6,500 to 7,700 feet. Dominant slopes are 25 to 40 percent. The climate is on the border between humid subtropical and temperate continental. Mean annual air temperature ranges from about 49° to 55° F Mean annual precipitation ranges from about 20 to 26 inches which comes as gentle rains and perhaps heavy snows in winter and high intensity localized thunderstorms in summer. The dominant native vegetation is a mix of manzanita, Arizona white oak, silver leaf oak, alligator juniper, pinyon pine (dominantly Mexican), Chihuahua pine, and ponderosa pine.

9BH/M is characterized by moderately sloping to very steep mountain slopes at elevations of about 7,000 to 9,000 feet. Dominant slopes are 25 to 80 percent. The climate is temperate continental. Mean annual air temperature ranges from about 45° to 52° F. Mean annual precipitation ranges from about 22 to 26 inches

which comes mostly as snow in the winter and high intensity thunderstorms in summer. The dominant native vegetation is ponderosa pine, alligator juniper, some gambel oak, and madrone. Good examples of 9BH/M occur in the Pinaleno, Santa Catalina, Chiricahua, and Huachuca Mountains.

9CH/M is characterized by moderately sloping to very steep mountain slopes at elevations of about 6,800 to 9,000 feet. Dominant slopes are 25 to 80 percent. The climate is temperate continental. Mean annual air temperature ranges from about 45° to 50° F. Mean annual precipitation ranges from about 28 to 32 inches which comes as snow in the winter and high intensity thunderstorms in summer. The dominant native vegetation is Douglas fir and ponderosa pine. Good examples of this type occur in the Chiricahua, Huachuca, Pinaleno, and Santa Catalina Mountains.

9DH/M is characterized by moderately sloping to moderately steep mountain slopes at elevations of about 8,000 to 9,800 feet. Dominant slopes are 15 to 40 percent. The climate is boreal. Mean annual air temperature ranges from about 38° to 44° F Mean annual precipitation ranges from about 30 to 35 inches which comes in winter as heavy snows and high intensity thunderstorms in summer. The dominant native vegetation is white fir, Douglas fir, scattered aspen, and in a few areas, high densities of Engelmann spruce and corkbark fir. Good examples of this type occur at the top of the Chiricahua, Santa Catalina, and Pinaleno Mountains.

10R is characterized by nearly level to gently sloping intermittent streams at elevations of about 4,300 to 4,800 feet. Dominant slopes are 0 to 5 percent. The climate is steppe (hot). Mean annual air temperature ranges from about 66° to 72° F. Mean annual precipitation ranges from about 8 to 10 inches which comes from gentle rains in winter and high intensity localized thunderstorms in summer. Because of its position, significantly larger amounts of moisture are available. 10R is a riparian zone whose native vegetation includes mesquite, desert and seep willow, and desert broom. Gardner Canyon or the lower part of Cave Creek near Portal (off the Forest) is a good example of 10R.

11AR is characterized by nearly level to gently sloping intermittent streams at elevations of about 4,800 to 5,600 feet. Dominant slopes are 0 to 5 percent. The climate is steppe (hot). Mean annual air temperature ranges from about 56° to 64° F. Mean annual precipitation ranges from about 12 to 16 inches which comes from gentle rains in winter and high intensity localized thunderstorms in summer. Because of its position, significantly larger amounts of moisture are available. 11AR is a riparian zone whose native vegetation includes Fremont cottonwood, Arizona sycamore, a few emory oak and Arizona walnut, wolfberry, and Texas mulberry. Cave Creek, just south of Portal, is a good example of 11AR.

11BR is characterized by nearly level to gently sloping intermittent streams at elevations of about 4,600 to 5,600 feet. Dominant slopes are 0 to 5 percent. The climate is humid subtropical. Mean annual air temperature ranges from about 54° to 58° F. Mean annual precipitation ranges from about 16 to 19 inches which comes as gentle rains in winter and high intensity localized thunderstorms in summer. Because of its position, significantly larger amounts of moisture are available. 11BR is a riparian zone whose native vegetation is primarily large diameter emory oak, Arizona walnut, and alligator juniper. 11BR, especially on the Douglas District, is an extremely good fuelwood area.

12R is characterized by nearly level to gently to moderately sloping perennial, and frequently flowing intermittent streams at elevations of about 5,000 to 7,200 feet. Dominant slopes are 0 to 10 percent. The climate is humid subtropical to temperate continental. Mean annual air temperature ranges from about 46° to 52° F. Mean annual precipitation ranges from about 18 to 24 inches which comes as gentle rains and some snow in winter and high intensity localized thunderstorms in summer. Because of its position, significantly larger amounts of moisture are available. 12R is a riparian zone whose native vegetation primarily includes Arizona cypress, pinyon pine, apache pine, Chihuahua pine, ponderosa pine, Arizona white oak, Douglas fir, Arizona sycamore, silverleaf oak, aspen, emory oak, and Rocky Mountain maple. The South Fork of Cave Creek is a good example of 12R.

Table 2. Past and Future Management Considerations

FORPLAN CODE		DESCRIPTION
ALOTIS	-	All Isolated Mountain Ranges
ALLOTH	-	All Other Mountain Ranges
WILD	-	Areas Designated as Wilderness by Congress
BUNROB	-	Bunk Robinson Wilderness Study Area
ERNAOW	-	Existing Research Natural Areas outside a Wilderness Area
ERNAIW	-	Existing Research Natural Areas inside a Wilderness Area
PRORNA	-	Proposed Research Natural Areas
MADCAN	-	Madera Canyon
CAVECR	-	Cave Creek in the Chiricahua Mountains
HIREC	-	High Country Recreation: Coniferous Forest Area
ALLREC	-	Low Country Recreation: Grassland and Woodland Areas
RIPAR	-	Riparian Areas and Higher Ecosystem Extensions
CAVREC	-	Actual Developed Recreation Sites in Cave Creek
MADREC	-	Actual Developed Recreation Sites in Madera Canyon
DEVREC	-	Other Existing Developed Recreation Sites in the National Forest
GRAHAM	-	Mt. Graham Wilderness Study Area
WHITMR	-	Whitmire Canyon Wilderness Study Area
ERNARA	-	Existing Research Natural Areas inside a Wilderness Study Area

COEFFICIENT DEVELOPMENT

Resource Outputs

Water Yield

Water yield was calculated for each ecosystem and then assigned to appropriate analysis areas and expressed as the average acre-feet produced per annum from the total area.

Water yield was related to existing Forest vegetation and analysis areas. A literature review was first conducted to establish the average annual yield that could be expected from various vegetative types. This review resulted in an average annual water yield coefficient for each ecotype found on the Forest.

In order to establish a baseline to work from, water yield from the entire Forest was calculated using the SCS (Soil Conservation Service) method. This was supplemented with data from U.S. Geological Survey (USGS) stream gaging stations located on or near the Forest that could be used for this purpose. The results of this analysis indicated that the average annual water yield from the Coronado National Forest is currently 146,000 acre-feet.

The coefficients used to estimate current water yield are as follows:

Ecosystem/ Capability Area	Major Vegetation Dominant Range of Slopes	Water Yield Coefficients (average acre-inches per year
1P	Saguaro, palo verde, ocotillo, mesquite, catclaw, brittle bush 1 - 15%	.14
1HM	same as 1P except 25 - 40% slope	.17
1M	same as 1P except 40 - 100% plus slopes	.17

The coefficients used to estimate current water yield are as follows: (Continued)

Ecosystem/ Capability Area	Major Vegetation Dominant Range of Slopes	Water Yield Coefficients (average acre-inches per year
2P	Mesquite, curly mesquite, hairy, black, and sideoats gramas 1 - 15%	.14
2PH	same as 2P except 5 - 40% slopes	.14
3P	Plains lovegrass, curly mesquite, blue, hairy, and sideoats gramas cane beardgrass 1 - 15%	.90
4M	Wheat grasses, long tongue muhly, deer grass, pine drop seed, June grass, sedge species 0 - 5%	2.30
5H	Mountain mahogany, desert ceanothus manzanita, Toumey, Emory, silver leaf and Arizona white oak, pinyon pine 15 - 40%	1.50
5HM	same as 5H except 25 - 60% slopes	1.18
6P	Emory and Arizona white oak, alligator juniper, manzanita 1 - 15%	1.07
6PH	same as 6P except 5 - 35% slopes	1.10
6HM	same as 6P except 25 - 40% slopes	1.21
6M	same as 6P except 40 - 60% plus slopes	1.20
6PS	Sparse canopy cover of Emory and Arizona white oak, and same grasses as 3P 1 - 35%	.69
7P	Mexican Pinyon Pine, alligator juniper Arizona white and Emory oak 1 - 15%	1.65
7PH	same as 7P except 5 - 40% slopes	1.55
7HM	same as 7P except 25 - 40%	1.70
7M	same as 7P except 40 - 60& plus slopes	1.50
8M	Aspen, Rocky Mountain maple, box elder, several species of ash, New Mexican locust 15 - 40%	2.20
9AHM	Manzanita, Arizona white and silver leaf oak, alligator juniper, Mexican pinyon, Chihuahua and Ponderosa Pine 25 - 40%	2.10
9BHM	Ponderosa Pine, alligator juniper, Gambel oak, madrone 25 - 80%	2.30
9CHM	Douglas fir, Ponderosa pine	2.21
9DHM	White, Arizona Corkbark, and Douglas fir, Engelmann spruce 15 - 40%	2.12

The coefficients used to estimate current water yield are as follows: (Continued)

Ecosystem/ Capability Area	Major Vegetation Dominant Range of Slopes	Water Yield Coefficients (average acre-inches per year
10R	Dry riparian like zone with mesquite desert and seep willows, desert broom 0 - 5%	.16
11AR	Riparian zone with Fremont cottonwood, Arizona sycamore, Arizona walnut, wolfberry 0 - 5%	.88
11BR	Riparian like zone with Emory oak, Arizona walnut, alligator juniper 0 - 5%	.81
12R	Riparian zone with Arizona cypress, Apache, Chihuahua, and Ponderosa pine, Arizona white and silver leaf oak, Douglas fir, Arizona sycamore, Rocky Mountain maple, aspen 0 - 10%	1.62

Potential Water Yield Increases

After establishment of current water yield coefficients, the potential increases that could be expected using vegetation management techniques were addressed. Literature was again reviewed to determine the average annual increases that could be expected. The findings of this search are summarized here by ecosystem/capability area groupings.

1P, 1HM, 1M, 2P, and 2PH: Because of low precipitation, high evaporation rates, and sparse vegetation, water yields for this group and their respective analysis areas cannot be expected to increase as a result of vegetation management. (Ffolliott and Thorud, 1975).

3P and 4M: Inherently low water yielding characteristics and limited acreage make water yield improvement practices unrealistic. (Ffolliott and Thorud, 1975).

5H and 5HM: Assuming annual average precipitation of 16 to 21 inches, water yield increases of approximately 2.4 inches per year per acre treated could be expected (SCS Field Engineering Manual).

6P, 6PH, 6HM, 6M, 6PS, 7P, 7PH, 7HM, 7M, and 9AHM: Water yield increases of less than 0.50 inches per year per acre treated can be expected from these areas (Ffolliott and Thorud, 1975). This increase is not enough to be considered significant (Regional Direction, FSM 1922.24a R-3 Supplement 6, 1984).

8M: Very limited acreage makes water yield efforts impractical in this area.

9BHM: Assuming annual average precipitation of 22 to 26 inches, water yield increases of approximately 2.0 inches per year per acre treated could be expected (Ffolliott and Thorud, 1975). However, because of other higher valued resources and activities in 9BHM, this area is not generally available for water yield improvement treatments. Some of these higher valued activities or resources are recreation, wildlife, and visual quality.

9CHM and 9DHM: Assuming annual average precipitation of 28 to 35 inches, water yield increases of approximately 1.2 inches per year per acre treated could be expected (Ffolliott and Thorud, 1975). For the same reasons as 9BHM, 9CHM, and 9DHM are generally not available for treatment.

10R, 11AR, 11BR, and 12R: Vegetation management to increase water yields in riparian or riparian like areas would require the removal of trees critically important to recreation and wildlife. Because of this, water yield increases in these areas was not examined further.

In summary the potential water yield increases are as follows:

Ecosystem/Capability Area	On-site Potential Water Yield Increase Coefficients (acre-inches per year average)
1P, 1HM, 1M, 2P, 2PH, 3P, 4M	Not significant
5H, 5HM	2.4 (Does not consider water transmission losses between treated sites and downstream uses)
6P, 6PH, 6HM, 6M, 6PS, 7P, 7PH, 7HM, 7M, 8M, 9AHM	Not significant
9BHM, 9CHM, 9DHM, 10R, 11AR, 11BR, 12R	Not considered because of other higher valued resources and activities

Recreation

Recreation coefficients were developed by interviewing District personnel and taking RIM recreation use data and assigning this information to analysis areas based upon existing use. This use was expressed as average Recreation Visitor Days (RVD) per acre for dispersed, wilderness, and developed area recreation; the proportion of the analysis area that was assigned to each management intensity by FORPLAN determined the distribution of RVD's among these three categories of recreation. Recreation use information was further tabulated by ecogroup; i.e., desert grassland, woodland, coniferous forest, and riparian, and also by type of activity; i.e., water recreation, non-motorized recreation, and so forth as appropriate for the areas. The resulting RVDs for each activity type occurring in a given ecogroup were divided by the number of acres in that ecogroup to arrive at a per acre average annual RVD use value. These values served as the current base for future use projections. Potential use or demand for developed and dispersed recreation was assumed to increase at the same rate as the population growth of southern Arizona which is estimated to be 2 percent. These values were increased by 2 percent per year until the practical potential by ecotype was reached. Practical potential was calculated using the R-3 model and was done by ecotype and aggregated into the four ecogroups mentioned previously in this section. Additionally, for developed recreation demand, the Forest's capability to meet demand was based on currently planned developments, mid to long range thoughts of past and present recreation staffs, NFRS inventories, and current Management Plans (Santa Catalina Planning Unit and the Madera Canyon Planning Unit). Potential use for wilderness recreation was projected using an assumed rate of increase of 3.5 percent per year.

Soil Loss

Soil loss was modeled through the planning process for estimating sheet and rill erosion under various management activities for all analysis areas. It is expressed in terms of an average annual tons/acre value for each time period.

Soil loss was calculated for present conditions per direction contained in R-3 Terrestrial Ecosystem Note 2550-5, April 1981--Universal Soil Loss Equation (USLE) and modeled for future activities. The Universal Soil Loss Equation calculates soil loss based on various environmental conditions.

The equation is $A = (R)(K)(L\ S)(P)$.

Where:

"A" is the computed on-site soil loss in tons per acre per year. It is not sediment yield.

"R" is the rainfall factor. It is the sum of the energy intensity for a normal years rainfall. The relationship is:

$R = 25(P)^{1.5}$

R = rainfall factor

P = 2 year, 6 hour rain event

"K" is the soil erodability factor which represents the capability of a soil surface to resist erosion. It is a function of the soil physical and chemical properties that effect soil erosion. Significant properties effecting soil erosion include texture, organic matter, structure and permeability.

The relationship is:

$100\ K = 2.1\ M^{1.14}\ (10^{-4})(12-a)+3.25(b-2)+2.5(c-3)$

M = (% silt + % very fine sand)(% silt + % very fine sand + % sand)

a = % organic matter
b = soil structure factor
c = soil permeability factor

LS is the slope effect factor. The relationship is:

$LS = (a/72.6)^{m}(65.41 \sin^2 \theta + 4.56 \sin \theta + .065)$

a = slope length in feet
θ = angle of slope
m = .5 for slopes greater than or equal to 5%;
.4 for slopes 3.5-4.5%; .3 for slopes 1.0-3.0;
.2 for slopes 1%

"L" is the slope length factor which considers distance from the origin of overland flow to a point where slope decreases, or a point of entry into a channel or where it becomes concentrated.

"S" is the slope gradient factor.

It is the ratio of soil loss from the field gradient to a 9 percent reference slope.

"C" is the cover management factor. It relates the effect of effective ground cover to the computation of erosion. This factor reflects response to management activities.

"P" is the management practice factor. This factor shows the effect of management practices such as contour tillage and strip cropping which would effect runoff. In wild land situations this factor is assumed to be 1.0 unless specific project work will effect this factor in a measurable way. This factor is for project level work and is not suitable for planning.

The Universal Soil Loss Equation was used to predict changes in soil loss through the planning horizon by applying factors to the current soil loss. Coefficients developed for changes in cover factors or soil loss provided estimates of soil loss for the variety of management activities that could or are taking place on the Forest.

The following assumptions were made in modeling soil loss:

Location and timing of future management activities within an analysis area cannot be specified. The impact will be assumed to be uniform over a representative area. Soil loss is calculated as a weighted average based upon soil types present within representative areas for the time period.

The activity is completed within the time period being modeled.

A relationship exists between production of biomass and plant canopy and can be correlated to production of effective cover.

A computer program was written and used as an aid in grouping and calculating USLE values by Terrestrial Ecosystems. Known cover classes and canopy densities were used for this process and were taken from Terrestrial Ecosystems Surveys.

The resulting cover classes and USLE predictions were then grouped by capability areas by major management Forest levels into coefficients of tons per acre per year for the current soil loss and the natural (geologic) soil loss as shown in Table 3.

Table 3. Generalized Table of Sheet and Rill Erosion Coefficients

Capability Area:	1P	1HM	1M	2P	2PH	3P	4M
Representative Map Unit:	55	325	325	5/61	62	56	**
Average Slope %:	8	30	60	10	25	10	4
Average Slope Length:	150	125	75	150	125	150	50
R Factor:	45.928	50.597	55.413	50.597	50.597	50.597	70.711
K Factor:	.2	.2	.24	.2	.2	.17	.49
Average Existing Cover %:	34	36	36	36	46	43	75
Current Soil Loss:	1.908	14.691	28.641	2.782	8.583	1.232	.204
Natural Soil Loss:	1.327	1.548	26.585	2.354	7.157	.546	.126

Capability Area:	5H	5HM	6P	6PH	6HM	6M	6PS
Representative Map Unit:	252	252	59	253	309	334	333
Average Slope %:	25	40	8	25	35	50	25
Average Slope Length:	125	100	150	125	100	80	125
R Factor:	55.413	55.413	50.597	50.597	52.987	52.987	50.597
K Factor:	.2	.2	.2	.2	.17	.2	.17
Average Existing Cover%:	53	53	41	60	60	55	58
Current Soil Loss:	3.925	7.416	1.056	2.640	3.300	8.322	2.571
Natural Soil Loss:	3.023	4.798	.744	1.998	1.931	7.975	1.516

Capability Area:	7P	7PH	7HM	7M	8M	9AHM	9BHM
Representative Map Unit:	57	57	255	254	**	310	311
Average Slope %:	8	15	30	50	30	40	50
Average Slope Length:	150	125	125	80	125	100	80
R Factor:	55.413	55.413	55.413	55.413	70.711	60.374	65.474
K Factor:	.2	.2	.2	.2	.1	.1	.1
Average Existing Cover %:	53	54	63	57	60	56	68
Current Soil Loss:	.707	1.599	4.073	7.527	2.336	3.512	2.860
Natural Soil Loss:	.398	1.292	2.847	6.917	1.625	2.050	2.584

Capability Area:	9CHM	9DHM
Representative Map Unit:	308	312
Average Slope %:	60	30
Average Slope Length:	75	125
R Factor:	70.711	76.080
K Factor:	.1	.15
Average Existing Cover:	72	80
Current Soil Loss:	3.171	1.426
Natural Soil Loss:	3.171	1.426

** 4M and 8M are very limited in acres and no actual soil mapping unit has been established for them. Data is based on scattered observations.

Future soil loss was modeled for each management prescription using soil loss tolerances established by the Soil Conservation Service as a guide in conjunction with current and natural soil loss coefficients.

No coefficients were developed for capability areas 10R, 11AR, 11BR, and 12R because they are primarily drainage type units where USLE is not applicable. With the available Forest data, no other method exists to reasonably estimate soil losses from these units.

Grazing

Grazing capacity was calculated for all capacity and potential capacity range categories. Areas such as developed recreation sites, research natural areas, and excessively steep sloped areas were classified as no capacity range and received a coefficient of zero. Grazing capacity was expressed as average animal unit months (AUM's) per acre.

The most recent Range Production Utilization study for each allotment, where available, was used in conjunction with R-3 Terrestrial Ecosystem Note 2550-18, May 1981 to estimate the forage production for each capability area by each major management area (level 1 identifier) on the Forest. These values were then applied to the R-3 RANGELAND Model formula to arrive at the capacity in acres/aum.

The formula is as follows:

$$\text{ACRES/AUM} = \frac{\text{lbs. of forage intake/AUM}}{\text{(Forage production lbs./acre)} \times \text{(A.U.F.)} \times \text{(G.I.)}}$$

An AUM is an animal unit month or in other words one mature cow, or equivalent, grazing for one month. Forage intake in lbs./AUM equals 600 pounds of forage needed to sustain one AUM (RANGELAND Model).

Forage production in lbs./acre equals the estimated average pounds of forage produced on one acre of the appropriate capability area type.

The allowable use factor (A.U.F.) is the percentage of the forage production which can be used by grazing animals and allows for maintenance or needed improvement in range condition. Allowable uses were derived from current interviews with District Range Conservationists, current Production Utilization studies, and R-3 guidelines in Chapter 50, Range Analysis and Management Handbook, FSH 2209.21.

Grazing Intensity (G.I.) is a factor that is related to the level of management and the development of range structural improvements. A maximum grazing intensity factor of 1.0 would be used where management was intensive and range improvements were optimum.

Each Ranger District estimated the current capacity of each allotment on their District. A computer program was written to aid in the allocation of capacity appropriately over the Forest within the FORPLAN Model by analysis area, management prescription, level of grazing management, and time.

Five levels of livestock grazing management were considered for the purpose of analysis and projection of outputs. These levels were A, B, C, D, and E which range from no grazing (level A) to maximum grazing (level E). Specific definitions are contained in the DEIS (Glossary) under "Livestock Grazing Management Levels". Outputs associated with the various prescriptions are varying applications of management intensities and were dependent on specific prescription objectives. Projected outputs by prescription over time cannot be viewed as absolute in nature, but actually represent the estimated flow of outputs with varying management intensities over time. Actual output coefficients or total AUM outputs will be dependent on actual management intensity applied on an individual grazing allotment and actual rate of improvement in range condition and increase in forage production.

Current permitted use was determined by summarizing the permitted use on each allotment as of 1980. Direction in range administration on the Forest is to bring permitted AUMs in line with the grazing capacity of each allotment. This basic

goal has been incorporated into the current land management plan. Based on the current rate of progress and AUM capacity outputs under the preferred alternative, it is estimated that by the end of the second period or the beginning of the third that permitted use will balance with capacity. After this balance is reached, moderate levels of livestock increases might be expected. As time progresses into the final periods of the plan, allotments become more intensively managed and range conditions continue to improve. The projection of the current rate of progress is dependent on budget levels sufficient for operation and maintenance and range improvements as indicated in the preferred alternative. Lesser budget levels would most likely require a longer time frame for balancing permitted use with capacity.

Wildlife

The basis for wildlife recreation output coefficients came from a model developed under contract which suggested a method to calculate outputs for game, non-game, and threatened and endangered species. This model was modified by the R-3 Regional Office Wildlife Section and Region V of Arizona Game and Fish and was used to calculate the previously mentioned outputs. The following is an outline of how the coefficients were developed. The full methodology is available in the LMP files of the Coronado National Forest.

Recreation specialists on each Ranger District stratified fishing and hunting use (based on 1980 Arizona Game and Fish values) and non-game use (based on 1980 RIM data) by dispersed and non-dispersed activities. The terrestrial ecosystem in which the activity occurred was noted.

These RVD's by ecosystem group were then broken down into high and low access groups. Further divisions yielded an RVD sum by high or low access by management consideration (prescription). One main assumption used in these calculations was that 75% of the hunting occurred within a one half mile of a road (AGF, 1980). This assumption enabled use of the Recreation Opportunity Spectrum system. These RVD values were divided by the acres in the management consideration to give a coefficient in RVDs/acre/year.

The coefficients representing the current management situation were projected to the year 2080.

The following assumptions were used for calculation in each decade:

Game and Fish:

Big Game - Improvement of big game habitat through improved range conditions, water development, and habitat improvement projects would be offset by continued aggressive fire suppression in high density animal population ecotypes, expanded mining activity, and increased demand for space by increased human population. Big game population numbers would remain the same as would hunting permit numbers (AGF 1980a). In addition, an alternate assumption of two percent growth per year was used to estimate potential wildlife recreation needs.

Small Game - Analysis of State of Arizona strategic plans for cottontail, mourning dove, quail, pigeon, and squirrel showed generally a projected hunter demand through 1985 that matched the expected human population growth at a two percent increase per year. Coefficients for small game were allowed to follow human population growth (AGF 1980b).

Fishing - Consultation with Will Hayes (Fisheries Specialist for Region V, AGF) revealed fisherman demands matching population growth through 1985. From 1985 through 2080, the AGF would match demand by increasing hatchery production. A two percent per year increase for fishing was used.

Non-game - Review of Richards, et al. (1979:16) revealed a two percent increase in non-game use on the Coronado over an earlier planning period of 1979 to 1995. This two percent annual change was projected through 2080.

The following assumptions were used for calculation in each decade: (Continued)

Threatened and Endangered Species	-	Occupied acres were described in another report, Analysis of Management Situation Part VIII, Wildlife and Fish, and in Part XVII Vegetation Management (Coronado National Forest, LMP files).

Timber

Because the Coronado National Forest is not a timber forest, stand data was sparse and largely out of date. The latest information was used from the only two Districts that have any timber cutting at all, the Catalina and Safford Ranger Districts. This data was entered into a program called ECOSIM which is resident at the Fort Collins Computer Center. This program helped develop the timing for various strategies of cutting. The most reasonable of these strategies were modeled in FORPLAN and as a result net merchantable timber volume in MCF (thousands of cubic feet) per period was tracked.

The net merchantable timber volume represents the volume of merchantable timber which is scheduled for harvest. It includes sawtimber and roundwood products. When the non-declining yield constraint is applied in FORPLAN, the level of timber production is equal to or greater than the harvest for the preceding period.

Fuelwood

The supply of fuelwood was subdivided into four categories: (1) Mesquite, (2) Junipers and oaks, (3) Timber species when not harvested for timber, (4) Dead and down of the above groups.

A basic fuelwood inventory was available for most of the Forest and was used to estimate current fuelwood availability by species and accessibility. This information in MCF/acre was then applied to appropriate capability areas. Continued fuelwood cutting at present levels or higher is dependent on accessibility. A key consideration to meeting the increasing demand for fuelwood is providing road access to areas of currently inaccessible suitable fuelwood producing land. The supply of preferred fuelwood on currently accessible areas will be seriously reduced by the present demand which is expected to continue to increase. The coefficients in the fuelwood output tables were developed with the above information and reflect outputs appropriate to the applicable management prescriptions.

COEFFICIENT DEVELOPMENT (continued)

Benefit Values

Outputs and benefit values displayed in Table 4 were tracked in FORPLAN. Benefit values were developed from the 1985 RPA Program. All values are in terms of 1980, 4th quarter dollars.

Hunting and fishing wildlife recreation benefits were calculated as a weighted average of big game use, other game use, and fishing use. Nongame wildlife recreation benefits were used as given. Other dispersed recreation benefits were calculated as a weighted average use figure for urban, rural, roaded natural, semi-primitive motorized, semi-primitive non-motorized, and primitive ROS classes. These were further categorized according to whether a prescription provided standard or less than standard recreation experience.

Wilderness recreation use benefits were calculated as a weighted average use figure for semi-primitive motorized, semi-primitive, and primitive ROS classes. These were further categorized according to whether a prescription provided standard or less than standard recreation experiences.

Developed recreation benefits were calculated as a weighted average use figure for urban, rural, and roaded natural, ROS classes. These were further categorized according to whether a prescription provided standard or less than standard recreation experiences.

Benefit values for grazing are based on Economic Research Service (ERS) studies of the costs and returns for permitted grazing on the Forest. The benefit value is applied to permitted use which is within capacity. Permitted use above capacity is assigned a zero benefit value.

All benefit values remained constant throughout the planning horizon.

Sawtimber benefit values used were calculated by the Forest based on historical information and are a weighted average of all species harvested. Values used for cable logging are reduced to reflect the higher cost for cable operations compared to conventional tractor logging. Benefit values for fuelwood were used as given.

Soil loss was modeled as a negative benefit (cost). Significant differences in PNV among alternatives did not occur from valuing soil loss.

Minerals values were calculated outside the model for energy related leases, locatable minerals, and mineral materials. The benefit value used for energy related leases was $1.82 per acre. The benefit value used for locatable minerals was five-percent of market value. Market values for locatable minerals were computed on the basis of actual production and the "willingness-to-pay concept" for maintaining staked mining claims. The benefit value used for minerals materials was $2.82 per ton.

Water yield benefits were calculated outside the model using a value of $39.60 per acre foot for gross water yield estimates.

Mineral and water outputs remain constant between alternatives described in detail. These benefit values are calculated in the analysis of the alternatives; however, they do not effect the evaluation of alternatives based on PNV.

Table 4. Benefit Values for Outputs Used in FORPLAN Model

Output Name	Unit of Measure	Benefit Value (1980, 4th Quarter Dollars)
Livestock grazing permitted use	Animal Unit Month (AUM)	$13.12/AUM
Livestock grazing capacity	Animal Unit Month (AUM)	1/
Fuelwood	Cubic feet	$0.02822/Cubic foot ($5.64 MBF)
Timber (tractor harvest)	Thousand Cubic Feet (MCF)	$175/MCF ($35/MBF)
Timber (cable harvest)	Thousand Cubic Feet (MCF)	$ 50/MCF ($10/MBF)
Hunting and fishing use	Recreation visitor day(RVD)	$16.90/RVD
Nongame wildlife use	Recreation visitor day(RVD)	$22.76/RVD
Dispersed recreation use	Recreation visitor day (RVD)	
Less than standard		$6.04/RVD
Standard		$11.43/RVD
Wilderness recreation use	Recreation visitor day (RVD)	
Less than standard		$6.64/RVD
Standard		$12.52/RVD
Developed recreation use	Recreation visitor day (RVD)	
Less than standard		$4.56/RVD
Standard		$8.60/RVD
Soil loss	Tons	$-0.0005/ton

1/ Permitted use is valued up to the capacity. Permitted use beyond capacity is assigned a zero benefit value.

COEFFICIENT DEVELOPMENT (continued)

Costs

The Coronado National Forest model includes costs for all management practices and activities. Costs were based on Forest budget data for Fiscal Years 1980 & 1981. In addition to Forest Service expenditures, costs were also estimated for livestock grazing permittee investments and costs incurred by State Game and Fish Departments related to management of wildlife on the National Forest. Budget constraints are applied to Forest Service costs only.

Costs varied with the prescription because, the types of investment and level of operations and maintenance varied depending on the standards and guidelines applied to a given analysis area.

Some costs, such as operation and maintenance, occur annually. Other costs, such as construction and reconstruction occur periodically. Investment costs were incorporated within the period in which they occurred or averaged over several periods so that they could be added to annual costs. The resulting annual value was assumed to remain constant for that period.

All costs are valued as 4th quarter 1980 dollars.

Management practices and activities used are shown in Table 5.

Table 5. Management Practices and Activities

Code	Management Practice	Description
DU-1	Dispersed Recreation	Includes expenditures for the management, operation, and maintenance of dispersed recreation and visitor information recreation facilities. Includes planning, inventory, administration, operation, maintenance, management, resource treatment, administration of special use permits.
DU-2	Visual Resource Inventory and Planning	Includes expenditures for the management, protection, and enhancement of visual resources. Includes inventories, planning, and mitigation.
DU-3	Cultural Resource Management	Includes expenditures for the management, protection, and enhancement of cultural sites for public and scientific use. Includes planning, inventories, evaluation, protection, and enhancement.
DU-4	Trail Construction-Reconstruction	Includes expenditures for construction and reconstruction of trails. Includes bridges, retaining walls, rights-of-way, trailhead facilities, and similar structures necessary for visitor use, safety, and resource protection. Includes preconstruction, construction, and construction engineering.
DU-5	Developed Recreation-Operation & Maintenance	Includes expenditures for the management, operation, and maintenance of developed recreation and visitor information recreation facilities. Includes planning and inventory, administration, operation, maintenance, resource treatment, administration of recreation special use permits, and collection of recreation area use revenues.
DU-6	Developed Recreation Construction-Reconstruction	Includes capital investments necessary to complete proposed developments.

Table 5. Management Practices & Activities (Continued)

DU-8	Wilderness Management	Includes expenditures for management, operation, and maintenance of the wilderness resource and related facilities such as trails. Includes planning, inventory, administration, operations, and maintenance. Does not include expenditures for the management, operation, and maintenance of other resources and related facilities within the wilderness area.
DU-9	Wilderness Trail Construction-Reconstruction	See Code DU-4.
DU-10 & DU-11	Wildlife & Fish Operation and Maintenance	Includes expenditures for planning, management, administration, and maintenance of wildlife and fish habitat improvements.
DU-12 & DU-61	Threatened and Endangered Plant Species Habitat Improvement	Includes expenditures for structural and nonstructural improvements that benefit Threatened and Endangered plants. Includes special endangered species cultural measures as authorized under the Knutson-Vandenberg Act of June 9, 1930 as amended.
DU-13 & DU-61	Fish Habitat Improvement	Includes expenditures for structural and nonstructural improvements that benefit fisheries including Threatened and Endangered species. Includes special fish cultural measures as authorized under the Knutson-Vandenberg (K-V) Act of June 9, 1930 as amended.
DU-14 & DU-61	Game Habitat Improvement	Includes expenditures for structural and nonstructural improvements that benefit wildlife including Threatened and Endangered species. Includes special wildlife cultural measures as authorized under the Knutson-Vandenberg (K-V) Act of June 9, 1930 as amended.
DU-15 & DU-61	Nongame Wildlife Habitat Improvement	See Codes DU-13 & DU-14 above.
DU-16	Range Operation & Maintenance	Includes expenditures for managing the forage resource used by domestic livestock, including maintenance of range structural improvements, allotment management, range analysis, planning and administration.
DU-17 & DU-18	Range Improvements	Includes expenditures for construction of improvements for range management purposes, including fences, water development, and other range structures, revegetation of lands to establish forage cover, including re-establishing forage cover by natural revegetation, forage maintenance, and temporary protective fence construction and maintenance until area is open to grazing.
DU-60	Timber Stand Improvement	Includes expenditures for noncommercial, intermediate cuttings, and other treatments to improve the composition, constitution, condition, and increment of a timber stand.
None	Insect and Disease	Includes expenditures for planning, directing, and coordinating the Insect and Disease Management Program. Includes detection and evaluation surveys. Funds included with benefiting practice.
DU-19, DU-21 & DU-32	Timber Management	Includes expenditures for timber sale preparation, timber sale administration, timber management plans, silvilcultural examinations, timber purchaser road reconstruction, and road construction engineering.

Table 5. Management Practices & Activities (Continued)

DU-34 & DU-46	Soil/Water Management	Includes expenditures for soil and water resource planning, evaluation monitoring, administration, inspection and maintenance of soil and water improvements, including dams. Includes developing and administering plans for soil and water resource improvement, special studies, and monitoring the effects of land use on the soil and water resource.
DU-33 & DU-45	Soil/Water Improvements	Includes expenditures for restoring and improving soil and water resources on Forest Service administered lands. Includes measures to improve or restore the quality of productivity of the soil, reduce erosion, and improve the quantity or timing of waterflow.
DU-36	Energy Minerals Management	Includes expenditures for oil and gas, coal, geothermal, and uranium minerals. Includes administration of permits and leases.
DU-36	Non-Energy Mineral Management	Includes expenditures for nonenergy minerals, minerals materials, and administration of permits and leases. Also includes, mining law compliance and administration.
DU-38	Human Resource Programs	Includes all expenditures for providing human and community development programs.
DU-40	Land Management Planning	Includes planning for the Land Management Plan, compliance with the National Environmental Policy Act, and Implementation of the Land Management Plan.
DU-39, DU-41, DU-42 & DU-44	Land Ownership Management	Includes expenditures for processing, approval and administration of permits. Includes leases, easements, amendments, rights-of-way grants, and Federal Energy Regulatory Commission license and permits. Also includes, expenditures for land status maintenance, land ownership planning and exchange proposals.
DU-43	Land Line Location	Includes expenditures necessary to identify legal boundaries of National Forest lands. Specific items include corner search, boundary location, and related maintenance.
DU-47, DU-48 & DU-50	Existing Road and Trail Operation and Maintenance	Includes expenditures for system inventory, transportation system planning, and maintenance of roads and trails included on the National Forest.
DU-49 & DU-51	Road & Trail Construction-Reconstruction	Includes expenditures for construction and reconstruc- of system roads and trails.
DU-52	Facilities-Capital Investments	Includes expenditures for the construction of offices, dwellings, warehouses, and other related facilities.
DU-53 & DU-54	Facilities Maintenance	Includes expenditures for the maintenance of structural improvements used for fire and general administrative purposes such as offices, dwellings, lookout towers, warehouses, fences, water systems, telephone systems, and other related facilities.
DU-55	General Administration	
DU-56	Forest Fire Protection	Includes expenditures for fire prevention, detection, maintenance of fire equipment and initial attack forces, and supporting fire aviation operations for initial attack.

Table 5. Management Practices & Activities (Continued)

DU-56	Emergency Forest Fire Funds	Includes all expenditures for suppressing fires on Forest lands or endangering Forest Service administered lands. Includes false alarms, purchasing, reconditioning, and replacement of equipment and supplies expended or necessary for actual suppression.
DU-57	Fuel Treatment	Includes expenditures to dispose, reduce, manipulate and/or modify forest fuels and for fire management.
None	Forest Law Enforcement	Includes expenditures for the enforcement of laws governing the management of National Forest lands. Funds included with benefiting practice.
DU-58	Coop Law Enforcement	Includes expenditures for the enforcement of State and local law on National Forest System lands as provided for by agreements with States or political subdivisions thereof.

Table 5. Management Practices & Activities (continued)

ACTIVITIES

Code	Description
A01	Recreation planning and inventory.
A02	Cultural resource management.
A03	Visual resource inventory and planning.
A05	Recreation site construction.
A06	Recreation site rehabilitation.
A07	Visitor information services planning.
A08	Visitor information services--full service management.
A09	Visitor information services--reduced service management.
A11	Developed recreation sites--full service management.
A13	Developed recreation sites--reduced service management.
A14	Dispersed recreation--full service management.
A15	Dispersed recreation--reduced service management.
A16	Recreation management--private and other public sector.
B01	Wilderness planning and inventory.
B02	Wilderness area--full service management.
B03	Wilderness area--reduced service management.
C01	Fish and wildlife prescriptions.
C02	Wildlife surveys and coordination.
C03	Non-structured wildlife habitat improvement.
C04	Non-structured fish habitat improvement.
C05	Non-structured threatened or endangered plant habitat improvement.
C06	Structural wildlife habitat improvement.
C07	Structural fish habitat improvement.
C08	Structural threatened or endangered plant habitat improvement.
C09	Wildlife habitat maintenance.
C10	Fish habitat maintenance.
C11	Threatened and endangered plant habitat maintenance.
C12	Wildlife and fish cooperation with other agencies and groups.
D01	Range resource planning and inventory.
D02	Range resource management.
D03	Range forage improvement.
D04	Range forage improvement maintenance.
D05	Range structural improvements.
D06	Maintenance of range structural improvements.
E00	Timber resource management planning and inventory.
E05	Timber stand improvement.
E06	Timber sale preparation.

Table 5. Management Practices & Activities (Continued)

E07	Timber harvest administration.
F01	Water resource planning.
F02	Water resource inventory.
F03	Water resource monitoring.
F04	Water uses management.
F05	Water resource improvement.
F06	Water resource improvement maintenance.
G01	Mining law compliance and administration.
G02	Minerals management - oil and gas.
G04	Minerals management - geothermal.
G05	Minerals management - uranium.
G06	Minerals management - non-energy.
G07	Minerals management - common minerals material.
H02	Youth conservation corps program.
H03	Young adult conservation corps program.
H04	Senior community service employment program.
H06	Volunteers in the National Forests.
H07	Other human resource programs.
J01	Special use management (non-recreation).
J04	Withdrawals, modifications, and revocations.
J05	Land status maintenance.
J06	Property boundary location.
J07	Property boundary and corner maintenance.
J10	Encroachment.
J11	Land ownership planning.
J12	Land adjustment planning.
J13	Land exchange.
J15	Land acquisition.
J18	Rights-of-way acquisition.
J22	Forest land and resource planning.
552	Order 3 soil inventory.
553	Order 4 soil inventory.
K03	Soil resource planning.
K04	Soil monitoring.
K05	Soil resource improvement.
K06	Soil resource improvement maintenance.
L01	Transportation system planning and inventory.
L05	Arterial road reconstruction.
L09	Collector road reconstruction.
L10	Local road preconstruction.
L11	Local road construction engineering.
L12	Local road construction.
L13	Local road reconstruction.
L19	Road maintenance.
L20	Trail inventory and planning.
L21	Trail preconstruction.
L22	Trail construction and reconstruction.
L23	Trail system management.
L24	Fire, aviation and other construction and reconstruction.
L25	Fire, aviation and other facility maintenance.
L28	Dam administration and management.
P01	Fire management planning and analysis.
P02	Fire prevention.
P03	Fire detection.
P04	Initial attack forces.
P07	Forest fire support and facilitating services.
P08	Initial attack fire suppression action.
P09	Escaped fire suppression.
P10	Fuel management inventory.
P11	Treatment of activity fuels.
P12	Treatment of natural fuels.
P14	Fuel treatment area maintenance.
P15	Vegetation treated by burning.

Table 5. Management Practices & Activities (Continued)

P16	Air resource management.
P17	Air quality and visibility coordination.
P19	Aerial transportation of personnel.
P20	Aerial transportation of goods.
P21	Aerial application of materials.
P22	Aerial platform.
P24	Law enforcement.
P25	Cooperative law enforcement.
P27	Cooperative search and rescue.
P34	Insect and disease management - surveys and technical assistance.
P35	Insect and disease management - suppression.
P36	Insect and disease management plan inputs.
T02	General administration.
254	Administration of water uses.
255	Water uses inventory.
478	Commercial nonconvertible products sale and administration.
479	Free-use and administrative free-use administration.
908	Forest plan implementation.

ANALYSIS REQUIREMENTS

Economic Efficiency (Present Net Value)

Present net value (PNV) is the measure of economic efficiency used to maximize benefits realized from management of the Forest. It is defined as the discounted difference between the dollar value of all priced outputs and the dollar value of all expenditures for management and investment. The greater the PNV, the greater the net economic return.

Priced outputs that are included in PNV are all recreation visitor days (RVD), livestock grazing capacity measured in animal unit months (AUM), timber in thousands of cubic feet (MCF), and fuelwood (MCF). It does not include nonpriced benefits such as threatened and endangered species habitat maintenance or enhancement, maintenance of natural and scientific areas, protection of cultural resources, or visual quality protection. These nonpriced benefits together with the sum of PNV yield net public benefit, which is a more inclusive measure of total social welfare.

The dollar values used in calculating PNV are defined as the "willingness-to-pay-price," whether or not that price is actually collected by the Forest. PNV is, therefore, not synonymous with cash flow. The willingness-to-pay values represent potential dollar returns within the total economy.

Cost efficiency is a driving force in planning. Assumptions were necessary in determining projected future use levels and prices and costs to develop cost efficient prescriptions. Current use and supply levels were assumed to be at or near equilibrium. Anticipated levels of future use were developed for the Analysis of the Management Situation. Projected future use was derived from historical use, industry projections, and population projections. Standards and guidelines were developed to satisfy current and future use while still maintaining resource objectives.

PNV is a measure of the cost-efficient use of the Forest resources. However, resource management must be based on sound biological, physical, and social principles as well. Because it is not possible to assign dollar values to all resources, the final decision is the quantifiable PNV plus consideration of the non-quantifiable Forest resources.

A comparison of cumulative benefits, costs, and present net value between benchmarks is displayed in Table 8 of this Appendix. Economic efficiency between alternatives in relationship to the max PNV assigned value benchmark are displayed in Table 13, Chapter 2 of the D.E.I.S.

Minimum Management Requirements

The regulations for the National Forest Systems Land and Resource Management Planning [36 CFR 219] specifies: 1) The minimum legal management requirements to be met for accomplishing the goals and objectives of the National Forest System [36 CFR 219.17]; 2) the minimum requirements for integrating individual Forest resource planning into the Forest plan [36 CFR 219.14 through 219.26]. These are collectively called Minimum Management Requirements (MMRs).

The minimum legal requirements defined in [36 CFR 219.27] can be categorized as either resource protection requirements that must apply to all management prescriptions or to prescriptions which specify practices involving; 1) vegetative manipulation of tree cover for any purpose, 2) timber harvest and cultural treatment, or 3) even-aged silviculture.

The Forest complied with [36 CFR 219.27] primarily within the specific standards and guidelines associated with the individual resource management practices developed for prescription levels.

The Low Intensity prescription level contains the standards and guidelines for minimum management requirements to be present in all prescriptions. The Low Intensity level is the least management activity and cost to meet legal requirements.

Standards and guidelines which comply with requirements involving vegetative manipulation of tree cover or silvicultural practices were developed primarily for prescription levels other than Low Intensity where these types of activities were emphasized.

The minimum resource integration requirements specified in [36 CFR 219.14 through 219.26] were achieved through the Forest's planning process and in prescription standards and guidelines.

Social Impact Analysis

Social Impact Analysis is defined in FSM 1973 as "the determination of how Forest Service policies and actions affect the quality of people's lives or social well-being. The primary goal is to enable managers to take into account important social concerns in making decisions. Social Analysis is accomplished by comparing current social conditions in an area influenced by Forest Service actions with conditions likely to occur as a result of implementing management alternatives."

The objectives of social impact assessment are to:

- Determine in a systematic manner the social effects of Forest Service planning and decision-making.
- Provide the decision-maker with an assessment of social effects which can be considered along with the assessments of economic, physical, and biological effects in order to make a balanced decision which promotes the goal of attaining "productive and enjoyable harmony between man and his environment."
- Satisfy the requirements of the law (NEPA, NFMA, CEQ) and of Forest Service policy (FSM 1973).

The social analysis is conducted in accordance with "Guidelines for Social Impact Assessment", Region 3.

The following steps are used in the social analysis:

- Delineate geographic zones of influence that will be used to assess the effects of National Forest management on social variables. The first zone is the primary zone which is made up of the multi-county area (used in IMPLAN) and the sub-areas, which are a breakdown of local areas having a strong dependence on the National Forest.
- The secondary zone of influence comes from outside the primary zone, consisting of non-local and generally amenity uses.
- The third zone is the Native American and consists of the Indian tribes or groups using the Forest.

- Eight social variables affected by National Forest management are evaluated for each alternative. The variables are:

  Employment
  Income
  Population
  Community Lifestyle
  Social Organization
  Relationship to Minority Groups
  Land Use Patterns
  Attitudes, Beliefs, Values

Economic Impact Analysis

The IMPLAN model is used to respond to the [36 CFR 219] Planning Requirements for Economic Impact Analysis. It has been designed to provide the planning analyst with a regional input-output model for any applicable area, and perform evaluations of potential economic effects in support of the planning process.

The outputs for each alternative (FORPLAN results) are entered into the IMPLAN model. The resulting figures for employment, income and population are evaluated against the current situation baseline for effects on the sub-areas.

The inputs used by the IMPLAN model are:

Timber, Sawtimber (MMBF)
Timber, Products (MMBF)
Fuelwood, Commercial (MMBF)
Fuelwood, Personal (MMBF)
Picnicking (MRVD)
Camping (MRVD)
Skiing Downhill (MRVD)
Dispersed, Non-Motorized Recreation (MRVD)
Dispersed, Motorized Recreation (MRVD)
Snowmobiling (MRVD)
Hunting, Big Game (MRVD)
Hunting, Small Game (MRVD)
Wildlife, Non-Game (MRVD)
Fishing (MRVD)
Livestock, Cattle (MAUM)

The outputs are changes in employment and income (Forest Service generated) by sector. Eighty-nine sectors are impacted in the Forest Service program. The most significantly impacted sectors are shown in tables in Chapters 3 and 4. They are:

Logging and Sawmills,
Wholesale Trade,
Retail Trade,
Lodging,
Restaurants and Bars,
Amusement and Recreation,
Livestock, and
Oil and Gas Development

The economic analysis is based on the "IMPLAN User's Manual", August 1982 and IMPLAN, the Forest Service Model to assess economic impacts required by NEPA, and NFMA. The analysis is conducted in accordance with "Guidelines for Social Impact Assessment", Region 3.

A social impact assessment panel consisting of all District Rangers, was formed to assess the social impacts on: Lifestyle, social organization, land use patterns, and attitudes, beliefs and values. The panel members met originally with their employees to assess the current situation (Chapter 3). Later the panel met to determine the effects of the management alternatives. The panel was given employment and income data and other additional information from the ID team. Under their guidance, an analysis was written and reviewed. Refer to Chapter 4 of the Environmental Impact Statement.

BENCHMARK ANALYSIS

Early in the planning process an analysis of the management situation was completed to determine the ability of the planning area to supply goods and services [36 CFR 219.5 (e)]. The purpose of the analysis was to evaluate all potentials for multiple use in formulating a reasonable range of alternatives. Benchmarks representing a broad range of feasible options were generated through the FORPLAN model to identify opportunities for resolution of issues, concerns, and opportunities; and, to delineate the maximum and minimum limits of the decision space in which feasible alternatives for resource mixes could be considered, given physical, biological, and legal criteria.

The current and low intensity management directions were included as benchmarks. Maximum benchmark analysis falls into two categories. The first, monetary benchmarks, projected maximum present net value of those resources having an established market value or an assigned value. Biological benchmarks, maximized outputs of timber, recreation, wildlife, water yield, range, watershed condition and wilderness.

Table 6 provides a description of each benchmark developed. Each description includes an objective function. When the objective function specifies assigned values it includes all resources having an established value. When the objective function specifies market values it includes only those resources having an established market value (timber, fuelwood, grazing capacity and developed recreation use).

Table 7 displays benchmark outputs in decreasing order of present net value. The difference in the fifth period output from the maximum present net value (assigned values) benchmark is also shown.

An apparent anomaly in Table 7 has a good explanation. The Maximize Grazing benchmark produces more timber and fuelwood than the Maximize Timber benchmark. The reason for this is that only outputs for the first five decades are shown in this table. The Maximize Grazing benchmark constitutes a departure alternative for timber and fuelwood; after the fifth decade the levels of these outputs fall down to below what they would have achieved under the Maximize Timber benchmark.

Table 8 displays present net value, present value cost, and present value benefits in decreasing order of present net value and compares benchmarks to the maximum present net value (assigned values) benchmark. The difference in present net value from the maximum present net value benchmark is also shown.

Table 6. Benchmark Descriptions

Purpose	Objective Function	Constraint [1/]	Discussion
Maximize PNV Assigned Values			
To project future resource uses, outputs and costs which will maximize Present Net Value (PNV) based on all resources having an assigned value.	Maximize Present Net Value (assigned values) for 10 periods.	None	This is an economic benchmark. The PNV produced in this run is used as the reference point to evaluate the impact on PNV resulting from constraints applied in other runs. This run represents the most cost-efficient manner of managing the Forest based on all resources having an assigned value.
Maximize PNV Market Values			
To project future resource uses, outputs, and costs which will maximize Present Net Value of those outputs which have an established market value. Market values are assigned to sawtimber, fuelwood, livestock grazing capacity and developed recreation use.	Maximize Present Net Value (market value) for 10 periods.	None	This is an economic benchmark. This run represents the most cost-efficient method of managing the Forest based on only those resources having established market values. It serves as a basis for comparing quantities of market outputs with those in the maximum Present Net Value (assigned value) Benchmark. This benchmark provides a limited level of issue resolution.
Low Intensity			
To define the minimum management to meet legal requirements.	Maximize Present Net Value (assigned values) for 10 time periods.	Prescriptions Only low intensity prescriptions were allowed into solution.	This benchmark meets only minimum management standards required by regulation. It establishes the base level for all resource outputs. All other alternatives meet or exceed these levels. This benchmark does not adequately respond to most issues and concerns.

[1/] Timber legal and policy constraints such as non-declining yield, culmination of mean annual increment, long termed sustained yield link, and ending inventory constraints apply to all benchmarks except for the maximize grazing benchmark.

Table 6. Benchmark Descriptions (Continued)

Current Direction			
To evaluate the consequences of continuing with the current management program.	Maximize Present Net Value (assigned values) 10 time periods.	Prescription Only current management prescriptions were allowed into solution. These prescriptions force a budget constraint equal to FY 1980.	This is the No Action Alternative. It establishes a base line from which to measure changes in current management emphasis.
Maximize Period 1 Timber			
To maximize net merchantable timber in thousand cubic feet in Period 1.	1. Maximize net merchantable timber in thousand cubic feet in Period 1. Then 2. Maximize Present Net Value (assigned values) for 10 time periods.	1. Floor on timber yield in million cubic feet equal to 98% of the biological potential established in the maximize timber run. Period 1 2 3 4 5 8.0 8.0 8.0 8.0 8.0	This benchmark was used for timber analysis purpose. It results in the same outputs and effects as maximizing timber for 10 time periods.
Maximize Grazing Capacity			
To project the maximum potential of the Forest to produce grazing capacity in animal unit months.	1. Maximize grazing capacity for 10 time periods. Then 2. Maximize Present Net Value (assigned values) for 10 time periods.	1. Range Floor on grazing capacity in thousand animal unit months equal to or greater than 98% of the biological potential established in the max grazing capacity run. Period 1 2 3 4 5 3415 3667 3878 3961 4002	This is a biological benchmark. It establishes the maximum level of grazing capacity to be used for emphasizing grazing outputs on the Forest while integrating other resource outputs in a cost effective manner. No limits are placed on demand. Supply is limited to the biological capability of the ecosystem to produce on suitable lands. It also provides a basis for determining the opportunity costs associated with this objective. This benchmark is responsive to concerns expressed about grazing.

Table 6. Benchmark Descriptions (Continued)

Maximize Wildlife			
To project the maximum potential of the Forest to produce wildlife and fish user days.	1. Maximize non-game wildlife and hunting & fish use for 10 time periods. 2. Maximize Present Net Value (assigned values) for 10 time periods.	1. None 2. Wildlife Floor on wildlife and fish use in thousand recreation visitor days equal to or greater than the biological potential established in the max non-game and hunting and fishing runs. Non-game Period 1 2 3 4 5 982 1136 1364 1644 1969 Hunt & Fish Period 1 2 3 4 5 2473 2953 3480 4087 4806	This is a biological benchmark. This benchmark represents the most cost-efficient method of managing the Forest under an objective of maximizing the biological potential of wildlife opportunities. It also provides a basis for determining the opportunity costs associated with this objective. This benchmark specifically addresses issues regarding wildlife.
Maximize Watershed Condition			
To maximize Present Net Value while emphasizing watershed condition Forest-wide.	1. Minimize soil loss for 10 time periods. 2. Maximize Present Net Value (assigned values) for 10 time periods.	1. None 2. Ceiling on soil loss in thousand tons equal to or less than 102% of the soil loss established in minimize soil loss run.	This benchmark represents the most cost-efficient method of managing the Forest while maximizing watershed condition. It provides a basis for determining opportunity costs associated with this emphasis. This benchmark is highly responsive to concerns expressed about watershed conditions.

Table 6. Benchmark Descriptions (Continued)

Maximize Water Yield			
To project the maximum potential of the Forest to produce water.	None	None	This is a physical benchmark. It establishes the high level of water yield to be used for emphasizing water yield on the Forest. It was developed outside the FORPLAN model because of the limited potential to increase water yield. Supply is limited to the biological capability of the ecosystem to produce on suitable lands.
Maximize Recreation			
To project the maximum potential of the Forest to produce non-wildlife related recreation.	1. Maximize recreation visitor days separately for developed, dispersed, and wilderness use for 10 time periods 2. Maximize Present Net Value (assigned values) for 10 time periods.	1. None 2. Recreation Floor on thousand recreation visitor days set equal to or greater than the physical potential established in the max recreation use runs. Period (Developed) No constraint necessary due to cost efficiency. Period (Non-Wilderness Dispersed) 1 2 3 4 5 8186 9984 12159 14829 18057 Period (Wilderness Dispersed) 1 2 3 4 5 3066 3738 4554 5557 6770	This is a physical benchmark. It establishes the base level of non-wildlife related recreation to be used for emphasizing recreation opportunities. This benchmark represents the most cost efficient method of managing the Forest under an objective of producing high levels of non-wildlife related recreation opportunity. It also provides a basis for determining the opportunity costs associated with this objective. This benchmark addresses concerns regarding recreation opportunity and experience diversity. Supply is limited by (1) capability of the ecosystem to withstand recreational activities and (2) areas classified as wilderness through Congressional legislation.
Maximize Wilderness Acres			
To project future resource outputs, costs and effects associated with maximizing the opportunity for new wilderness designation.	Maximize Present Net Value (assigned values) for 10 periods.	Wilderness acres equal to the three wilderness study areas (90,800 acres) plus the existing wilderness areas (339,190 acres)	This is a physical benchmark. It establishes the maximum acres for wilderness opportunities while managing the Forest in the most cost efficient manner. It provides a basis for determining the opportunity costs associated with this objective. The benchmark is responsive to the wilderness issues.

Table 6. Benchmark Descriptions (Continued)

Minimize Wilderness Acres			
To project future resource outputs, costs, and effects associated with minimizing the opportunity for new wilderness designation.	Maximize Present Net Value (assigned values) for 10 periods.	Wilderness acres equal to the existing wilderness areas (339,190 acres)	This is a physical benchmark. It maintains wilderness opportunities (acres) at existing levels while managing the Forest in the most cost efficient manner. It provides a basis for determining the opportunity costs associated with this objective. The benchmark is responsive to the wilderness issues.
Maximize Wilderness Acres While Maintaining 1981 Output Levels For Other Resources			
To determine the level of new wilderness opportunities compatible with maintaining other resource opportunities at or near 1981 levels.	1. Maximize wilderness acres for 10 time periods.	1. Ceiling on wilderness acres equal to existing and three study areas. (429,990 acres) Floor on grazing capacity, fuelwood, and timber harvest and developed recreation use equal to or greater than the following for fifth time period. Grazing capacity - 3260 MAUM Timber harvest - 0.75 MMCF Fuelwood harvest - 4078 MCF Developed recreation use - 11,800 MRVD	This benchmark establishes the level of new wilderness acres compatible with sustaining current resource opportunities by the end of the planning period. It provides a basis for determining the opportunity costs associated with these objectives. This benchmark is responsive to some issues but not others.
	2. Maximize PNV (assigned values) for 10 time periods.	2. Wilderness acres equal to 429,990 Floor equal to or greater than 98% of the resource outputs obtained from above run.	

	Period			
1	2	3	4	5
Timber				
4.0	4.0	4.0	4.0	4.0
Fuelwood				
3811	3959	4065	4009	3996
Developed Use				
12343	13411	13326	12662	11563
Grazing Capacity				
3333	3510	3692	3762	3798

Table 7. Average Annual Output by Benchmark with Change in Fifth Period Compared to Max PNV Assigned

Benchmarks in Decreasing Order of Cumulative PNV Over the Planning Horizon	Change In Fifth Period Outputs	Period 1	2	3	4	5
Output: Developed Recreation (MRVD)						
Max PNV Assigned		1,547	1,911	2,198	2,460	2,715
Max Recreation	0	1,547	1,910	2,198	2,460	2,715
Max Wildlife	0	1,547	1,910	2,198	2,460	2,715
Max Wilderness Acres	0	1,547	1,910	2,198	2,460	2,715
Max Watershed	0	1,547	1,910	2,198	2,460	2,715
Max Timber	0	1,547	1,910	2,198	2,460	2,715
Min Wilderness Acres	0	1,547	1,910	2,198	2,460	2,715
Max Grazing	0	1,547	1,910	2,198	2,460	2,715
Max Wilderness Acres with 1981 Outputs	0	1,547	1,910	2,198	2,460	2,715
Current	-1280	1,287	1,395	1,427	1,434	1,435
Low Intensity	-2075	1,299	1,318	1,210	999	640
Max PNV Mkt.	0	1,547	1,910	2,198	2,460	2,715
Minimum Level	-2715	0	0	0	0	0
Output: Other Dispersed Recreation (MRVD)						
Max PNV Assigned		808	985	1,199	1,462	1,781
Max Recreation	+25	819	999	1,216	1,483	1,806
Max Wildlife	+77	842	1,027	1,251	1,525	1,858
Max Wilderness Acres	+23	818	998	1,215	1,481	1,804
Max Watershed	-26	796	970	1,182	1,441	1,755
Max Timber	+27	820	1,000	1,218	1,485	1,808
Min Wilderness Acres	+107	856	1,044	1,271	1,550	1,888
Max Grazing	+2	808	986	1,200	1,464	1,783
Max Wilderness Acres with 1981 Outputs	-18	799	975	1,187	1,448	1,763
Current	+71	839	1,024	1,246	1,521	1,852
Low Intensity	-69	776	946	1,152	1,407	1,712
Max PNV Mkt.	-88	768	936	1,140	1,391	1,693
Minimum Level	-1336	202	246	300	365	445
Output: Other Wilderness Recreation (MRVD)						
Max PNV Assigned		357	436	531	648	789
Max Recreation	-31	343	419	510	622	758
Max Wildlife	-95	314	383	467	569	694
Max Wilderness Acres	+24	368	449	547	667	813
Max Watershed	+23	368	448	546	666	812
Max Timber	-34	342	417	508	620	755
Min Wilderness Acres	-145	292	356	433	529	644
Max Grazing	-3	356	434	529	645	786
Max Wilderness Acres with 1981 Outputs	-75	323	394	481	586	714
Current	-214	260	317	387	472	575
Low Intensity	-152	288	352	428	523	637
Max PNV Mkt.	-66	328	399	486	594	723
Minimum Level	-789	0	0	0	0	0

Table 7. Average Annual Output by Benchmark with Change in Fifth Period Compared to Max PNV Assigned (Continued)

Benchmarks in Decreasing Order of Cumulative PNV Over the Planning Horizon	Change In Fifth Period Outputs	Period 1	2	3	4	5
Output: Wildlife Recreation (MRVD)						
Max PNV Assigned		349	416	498	591	699
Max Recreation	+4	351	418	501	595	703
Max Wildlife	+16	356	425	510	605	715
Max Wilderness Acres	-8	345	411	493	585	691
Max Watershed	-8	347	412	492	584	691
Max Timber	+5	351	419	501	595	704
Min Wilderness Acres	+18	358	427	511	606	717
Max Grazing	-56	335	386	458	543	643
Max Wilderness Acres with 1981 Outputs	-59	334	384	456	540	640
Current	-73	324	384	450	534	626
Low Intensity	-225	269	282	334	401	474
Max PNV Mkt.	-73	326	374	443	529	626
Minimum Level	-538	83	98	115	136	161
Output: Grazing Capacity (MAUM)						
Max PNV Assigned		335	346	356	366	376
Max Recreation	-1	335	346	356	366	375
Max Wildlife	-2	335	345	355	365	374
Max Wilderness Acres	0	336	347	357	368	376
Max Watershed	-4	335	347	354	364	372
Max Timber	-3	333	344	354	365	373
Min Wilderness Acres	-2	335	345	356	366	374
Max Grazing	+26	346	369	388	397	402
Max Wilderness Acres with 1981 Outputs	+15	342	360	378	387	391
Current	-6	334	344	354	363	370
Low Intensity	-102	306	295	286	278	274
Max PNV Mkt.	-46	333	331	330	329	330
Minimum Level	-102	306	295	286	278	274
Output: Permitted Livestock Use (MAUM)						
Max PNV Assigned		353	344	352	366	376
Max Recreation	-1	353	344	351	366	375
Max Wildlife	-2	353	344	350	365	374
Max Wilderness Acres	0	354	345	353	368	376
Max Watershed	-4	353	343	350	364	372
Max Timber	-3	351	342	350	364	373
Min Wilderness Acres	-2	353	344	351	366	374
Max Grazing	+26	358	367	386	397	402
Max Wilderness Acres with 1981 Outputs	+15	354	358	378	387	391
Current	-6	350	341	351	363	370
Low Intensity	-102	327	296	281	277	274
Max PNV Mkt.	-46	351	330	325	328	330
Minimum Level	-376	0	0	0	0	0

Table 7. Average Annual Output by Benchmark with Change in Fifth Period Compared to Max PNV Assigned (Continued)

Benchmarks in Decreasing Order of Cumulative PNV Over the Planning Horizon	Change In Fifth Period Outputs	Period 1	2	3	4	5
Output: Net Merchantable Timber Volume (MCF)						
Max PNV Assigned		0	0	0	0	0
Max Recreation	0	0	0	0	0	0
Max Wildlife	0	0	0	0	0	0
Max Wilderness Acres	0	0	0	0	0	0
Max Watershed	0	0	0	0	0	0
Max Timber	+798	798	798	798	798	798
Min Wilderness Acres	0	0	0	0	0	0
Max Grazing	+1339	715	1,048	1.161	1.264	1,339
Max Wilderness Acres with 1981 Outputs	+551	473	494	516	537	551
Current	+430	430	430	430	430	430
Low Intensity	+75	75	75	75	75	75
Max PNV Mkt.	0	0	0	0	0	0
Minimum Level	0	0	0	0	0	0
Output: Fuelwood Sold (MCF) (includes green, dead & down and topwood)						
Max PNV Assigned		198	188	142	95	95
Max Recreation	+1	199	188	142	96	96
Max Wildlife-PNV	-10	199	188	137	84	85
Max Wilderness Acres	-3	190	179	136	92	92
Max Watershed-PNV	+5	179	169	135	100	100
Max Timber-PNV	+1	199	188	142	96	96
Min Wilderness Acres	+8	208	197	150	103	103
Max Grazing-PNV	+198	314	310	305	293	293
Max Wilderness Acres with 1981 Outputs	+305	381	400	407	401	400
Current	+143	234	227	241	239	238
Low Intensity	-95	0	0	0	0	0
Max PNV Mkt.	-31	68	64	64	64	64
Minimum Level	-95	0	0	0	0	0

Table 8. Comparison of Present Value Benefits, Present Value Costs, and Present Net Value of Benchmarks to Maximum PNV Assigned Benchmark over the 100 Year Planning Horizon (millions of 1980 dollars discounted at four-percent).

Benchmarks	Present Value Benefits	Present Value Costs	Present Net Value	Difference in PNV from Max PNV Assigned
Max PNV Assigned	1262.3	274.8	988.5	
Max Recreation	1262.7	274.9	987.8	-0.7
Max Wildlife	1262.1	275.9	986.2	-2.3
Max Wilderness Acres	1259.5	274.8	984.7	-3.8
Max Watershed	1257.7	274.0	983.7	-4.8
Max Timber	1265.0	281.7	983.3	-5.2
Min Wilderness Acres	1258.2	275.3	982.9	-5.6
Max Grazing	1259.5	328.3	931.2	-57.3
Max Wilderness Acres with 1981 Outputs	1236.9	336.2	900.7	-87.8
Current	742.2	183.2	559.0	-429.5
Low Intensity	617.5	139.7	477.8	-510.7
Max PNV Mkt.	543.5	233.8	309.7	-678.8

The section on Economic Efficiency Analysis explained the difference between market and assigned values for priced outputs. The benchmarks displayed in Table 9 were developed to examine the effects, if any, that market versus assigned values have on output levels. The Max PNV (Assigned Values) Benchmark has benefit values assigned to all outputs. The Max PNV (Market Values) Benchmark has benefit values assigned to only market outputs.

At present, it is National policy to provide most Forest outputs either at no charge to consumers, as is the case of water, or at a charge less than the willingness to pay price, as is the case of developed recreation. Based on the comparison of market values and assigned values, it is apparent the Coronado National Forest ranks high in resource outputs which the public would be willing to pay for, even though benefit dollars are not actually collected by the Forest for these outputs. They include all forms of recreation. Timber and fuelwood harvest are not cost effective practices when valued only for the resulting wood products. Therefore, under the Maximize PNV with Market Value benchmark over 980,000 acres are assigned to a low intensity prescription; this results in less fuelwood being produced under the Market Value benchmark. Some fuelwood products are generated in both benchmarks as a result of other activities. Livestock grazing appears to be cost effective only at moderate levels.

When considering only market values, the most cost effective approach to management on the Coronado National Forest is through low intensity prescriptions Forest-wide with exception of maximum recreation emphasis in existing and new developed recreation sites. When considering all priced outputs, a larger PNV results which indicates that taxpayers, as owners of this National Forest, can realize a much larger net return on their investment.

Table 9. Comparison of Average Annual Outputs for Max PNV (Market Values) and Max PNV (Assigned Values) Benchmarks

Outputs	Period 1	2	3	4	5
MARKET VALUES					
Net Sawtimber (MCF)					
PNV Mkt.	0	0	0	0	0
PNV Assigned	0	0	0	0	0
% Change	0	0	0	0	0
Fuelwood (MCF)					
PNV Mkt.	68	64	64	64	64
PNV Assigned	198	188	142	95	95
% Change	-66	-66	-55	-33	-33
Grazing Capacity (MAUM)					
PNV Mkt.	333	331	330	329	330
PNV Assigned	335	346	356	366	376
% Change	-1	-4	-7	-10	-12
Developed Recreation (MRVD)					
PNV Mkt.	1,547	1,910	2,198	2,460	2,715
PNV Assigned	1,547	1,911	2,198	2,460	2,715
% Change	0	0	0	0	0
ASSIGNED VALUES					
Dispersed Recreation (MRVD)					
PNV Mkt.	768	936	1,140	1,391	1,693
PNV Assigned	808	985	1,199	1,462	1,781
% Change	-5	-5	-5	-5	-5
Wildlife Recreation (MRVD)					
PNV Mkt.	326	374	443	529	626
PNV Assigned	349	416	498	591	699
% Change	-7	-10	-11	-10	-10
Wilderness Recreation (MRVD)					
PNV Mkt.	328	399	486	594	723
PNV Assigned	357	436	531	648	789
% Change	-8	-8	-8	-8	-8

FORMULATION of ALTERNATIVES

The formulation of alternatives is the culmination of planning actions specified in (36 CFR 219.12(a) through 219.12(f)). The requirements of (36 CFR 219.12(f) for formulation of alternative are discussed in Chapter 2. The National Forest Interdisciplinary Team used a four step process to formulate a range of alternatives which would provide a basis for identifying an alternative maximizing net public benefits, consistent with resource integration and management requirements of (36 CFR 219.13 through 219.27). That process is described below.

1) Forest issues were identified through public involvement efforts. Management concerns were also identified through an internal analysis. Issues and management concerns were then consolidated into issue (demand) statements which would be specifically addressed in development of alternatives and the subsequent recommendation of a Proposed Action.

   Public involvement efforts and issue and concern statements are described in detail in Chapter 1 and Appendix A.

2) Individual resource inventories were completed to identify site specific areas having common environmental characteristics. Data were collected and stored in the Forest resource data base. An Analysis of the Management Situation (AMS) was conducted to describe the existing condition of the Forest and to identify resource management opportunities (supply). Chapter 3 summarizes the AMS.

3) Primary objectives were developed for an array of alternatives that were responsive to issues and concerns. The objectives were tailored to provide a wide range of Forest management alternatives. Alternative emphasis included balancing permitted numbers with range capacity, timber and fuelwood production, recreation management, watershed condition improvement, wildlife management, riparian habitat improvement and additional wilderness recommendations. Six alternative scenarios were developed with varying degrees of issue and concern resolution. Chapter 2 provides a detailed discussion of alternatives eliminated from detailed study and those alternative considered in detail.

4) This step involved an evaluation of all benchmark runs presented in the preceding section of this appendix.

   Each benchmark first had to meet the test of maximizing present net value. These runs were then assessed for their ability to conform to the alternative scenarios previously developed.

The purpose; criteria and assumptions; the relationships to issues, concerns, and opportunities; and relationship to benchmarks are described in Chapter 2.

In accordance with (36 CFR 219.16(3)), departures from base sale schedules were considered. None of the criteria requiring a departure were met.

The constraints used in the Coronado's model for alternatives considered in detail are shown in Table 10. The objective function for all alternatives was to maximize present net value.

Constraints normally common to all alternatives such as minimum management requirements (MMRs), nondeclining yield (NDY), culmination of mean annual increment (CMAI), long-term sustained yield link (LTSY-L), and ending inventory (EI), were not applied as right-hand-side constraints in FORPLAN because they were built into timber harvest yield tables available for all alternatives.

In the analysis, constraints were placed on the alternatives as a set-of-constraints to achieve the objectives of each alternative. Constraints were not applied incrementally. The effects of individual constraints cannot be specified because individual constraints within a set of constraints are interdependent. Discussions of effects of constraints deal with the effects of the set-of-constraints as a whole. The changes in PNV, PVC, and PVB between the alternatives are a result of applying different sets of constraints to the maximum PNV benchmark and are displayed in Chapter 2.

The sets-of-constraints were developed by the Interdisciplinary Team and reviewed by the Forest Management Team. Based on the collective experience and expertise of the team, the least cost constraints were selected to achieve the objectives of the alternative. The set-of-constraints applied was therefore, the most cost effective means of achieving the objectives of the alternative.

Table 10 - Alternative Descriptions

Alternative Goals	Objective Function	Type of Constraints 1/	Discussion
Proposed Action Resolve the maximum number of issues and concerns and provide the maximum mix of resource opportunities within estimated future budget constraints.	Maximize present net value (assigned values)	**Output** (1) Floor on grazing capacity in period 5 of 3600 MAUM per decade.	(1) Grazing constraint used to achieve the highest capacity possible given other constraints.
		(2) Floor on fuelwood harvest in period 5 of 2300 MCF per decade.	(2) Fuelwood constraint used to achieve the highest capacity possible given other constraints.
		(3) Floor on developed recreation use in period 5. Floor - 15650 MRVD per decade.	(3) At least enough new developed sites are required to supply local needs in Sierra Vista.
		(4) New wilderness acres. Bunk Robinson - 0 Whitmire Canyon - 0 Mt. Graham - 32,845	(4) Without the "0" constraints, small unmanageable acres for wilderness prescriptions would be assigned to two wilderness study areas. The Mt. Graham acreage constraint is used to define the manageable sized area for that wilderness study area that is consistent with other management objectives.
		(5) ZBAs (Zoological-botanical areas.) Two areas for 4240 acres.	(5) These constraints protect unique qualities of ZBAs by preventing some uses (such as more intensive livestock grazing and fuelwood cutting) from detracting from desirable wildlife and vegetative characteristics.
		Budget (6) Forest Service costs in thousands of dollars per decade. Period 1 2 3 4 5 60000 70730 70730 70730 70730	(6) The budget was constrained to reflect realistic (but optimistic) budget expectations.

1/ Timber legal and policy constraints such as nondeclining yield, culmination of mean annual increments long term sustained yield link, and ending inventory constraints apply to all alternatives.

Table 10 - Alternative Descriptions (continued)

Alternative Goals	Objective Function	Type of Constraints 1/	Discussion
		Prescription	
		(7) Assign Prescription 7AH to riparian areas.	(7) Prescription P7AH insures protection of riparian areas; it meets the goals of the Regional Guide to have riparian areas in satisfactory condition by 2030.
		(8) Assign Prescription 7H to higher ecosystem extensions.	(8) Prescription P7H is similar to P7AH but extends protection to higher ecosystem extensions.
		(9) Assign Prescription P41 to coniferous forest lands.	(9) P41 is a timber harvesting prescription that emphasizes wildlife values; it includes the protection of astrophysical values in the Mt. Graham area.
		(10) Assign Prescription P3L to Cave Creek.	(10) P3L maximizes dispersed and wildlife recreation values in those parts of Cave Creek that are outside the ZBA.
A. Continue current management direction.	Maximize present net value (assigned values).	Prescription Only current prescriptions available. This also constrains the budget to approximately $5800 thousand dollars per year.	Same as benchmark. Serves as no action alternative.
B. Meet 1980 RPA resource objectives as assigned in the Regional Guide.	Objective Function Maximize present net value (assigned values).	Output Floors on livestock grazing, dispersed recreation use, wilderness use, hunting and fishing use, nongame use and developed recreation use. Wilderness acre constraints for each of the three wilderness study areas. Livestock grazing MAUM Periods 1: 3550; 2: 3690; 3: 3930; 4: 4020; 5: 4060	This alternative was designed to estimate the outputs and effects resulting from attempting to achieve RPA objectives assigned to the Forest. Objectives for livestock grazing and developed recreation use were modified after reviewing benchmarks for maximum supply potentials. Wilderness acre objectives were set based on review of maximize grazing capacity benchmarks.

Table 10 - Alternative Descriptions (continued)

Alternative Goals	Objective Function	Types of Constraint	Discussion
		Developed recreation MRVD Periods 1: 15,000; 2: 19,000; 3: 21,000; 4: 24,000; 5: 26,000 Dispersed recreation MRVD Periods 1: 6064; 2: 6435; 3: 6728; 4: 7020; 5: 7313 Wilderness recreation MRVD Periods 1: 1493; 2: 1584; 3: 1656; 4: 1728; 5: 1800 Hunting and Fishing MRVD Periods 1: 1306; 2: 1386; 3: 1449; 4: 1512; 5: 1575 Nongame MRVD Periods 1: 466; 2: 495; 3: 517; 4: 540; 5: 562 Wilderness Acres Bunk Robinson - 0 Whitmire Canyon - 0 Mt. Graham - 0	
C. Achieve implementable wilderness areas for three wilderness study areas by adjusting boundaries to eliminate most concerns.	Maximize present net value (assigned values).	New Wilderness Areas Bunk Robinson - 11,034 Whitmire Canyon - 11,494 Mt. Graham - 49,402	This alternative was designed to estimate the outputs and effects resulting from managing the three wilderness study areas as wilderness in the future. Boundaries were adjusted to eliminate most concerns the public and management.
D. Emphasize recreation, watershed and wildlife values and opportunities. Other opportunities such as fuelwood harvest and livestock grazing would be secondary considerations.	Maximize present net value (assigned values).	Output (1) Floor and ceiling on developed recreation use in fifth period. Floor - 11,800 MRVD Ceiling - 21,525 MRVD (2) New wilderness acres Bunk Robinson - 15,960 Whitmire Canyon - 12,840 Mt. Graham - 61,585	This alternative was designed to address many issues, concerns and opportunities related to watershed condition, livestock grazing riparian area management, recreation opportunities, wildlife values and wilderness. It provides the opportunity to evaluate outputs and effects resulting from the resolution of one side of various issues.

Table 10 - Alternative Descriptions (continued)

Alternative Goals	Objective Function	Types of Constraint	Discussion
		Output (continued) (3) New Research Natural Areas Ten areas for 8,269 acres. (4) New Zoological-Botanical Areas Eight areas for 37,290 acres. (5) Manage roadless areas for primitive recreation opportunities: Whetstone - 37,028 acres Dragoon - 29,672 acres North End - 30,934 acres Tumacacori - 46,142 acres Prescription (1) Prescription P41 assigned to riparian areas and higher ecosystem extensions. (2) Prescription P2L assigned to coniferous forest areas.	
E. Sustain opportunities for timber, fuelwood, developed recreation use, and livestock grazing on lands primarily suitable for that type of use. By the fifth time period, attempt to achieve 1981 levels of output wherever possible.	Maximize present net value (assigned values).	Output (1) Floor on fuelwood harvest in period 5 of 2500 MCF per decade. (2) Floor on livestock grazing in period 5 of 3760 MAUM per decade. (3) Floor and ceiling on developed recreation use in period 5. Floor - 11,800 MRVD per decade Ceiling - 21,525 MRVD per decade (4) New wilderness areas: Bunk Robinson - 11,034 Whitmire Canyon - 0 Mt. Graham - 61,985 Prescription (1) Assign Prescription 2H to coniferous forest lands.	This alternative was designed to give a more reasonable look at meeting RPA Objectives and to address issues, concerns and opportunities related to wilderness, livestock grazing, timber and fuelwood harvest and recreation uses. It provides the opportunity to evaluate outputs and effects resulting from the resolution of one side of various issues.

ESTIMATING THE EFFECTS OF CONSTRAINTS APPLIED TO BENCHMARKS AND ALTERNATIVES

As described in preceding sections, benchmarks and alternatives were developed to achieve different sets of goals and objectives responding to the ICOs in different degrees. Set-of-constraints were applied to achieve the goals and objectives of each benchmark and alternative. The most cost effective set-of-constraints were used to develop the benchmarks and alternatives. Use of sets-of-constraints to achieve the goals and objectives in a benchmark or alternative causes a reduction in PNV from the Max PNV benchmark because costs are increased and/or benefits are reduced in order to satisfy the constraint. The reduction in PNV is called the opportunity cost (trade-off) of the set-of-constraints. The trade-offs associated with the sets-of-constraints are shown in Table 8, Chapter 2 of the D.E.I.S. for the alternatives and Table 7, Appendix B for the benchmarks.

The constraints having the greatest impact on PNV were:

1) Budget constraints to hold alternative costs within reasonable budget expectations. These constraints held down PVC but also limited the amount of investment work and also significantly reduced PVB.

2) Developed recreation opportunity constraints during the planning horizon. These constraints limited PVC and the amount of investment work which significantly reduced PVB.

3) Increased grazing capacity for the RPA Alternative. This increased PVC due to increased investments in structural and nonstructural improvements, and watershed improvement to implement intensive grazing systems. This results in reduced PVB because of the increased costs without corresponding increases in benefits.

C - Management Prescriptions

OVERVIEW

These prescriptions were used for the development of alternative Forest plans. Detailed management practices, standards and guidelines for each are available for review at Coronado National Forest Offices. Some prescriptions were not selected for use in the Proposed Forest Plan. All prescriptions result in multiple uses and resource opportunities.

Table 1 at the end of this Appendix summarizes the actual individual prescription allocation by alternative. Table 2 of this Appendix shows the aggregation of prescriptions into management areas.

Low Intensity Prescriptions

Minimum management intensity to meet legal requirements. Operation and maintenance activities are at a low level. New investments are non-existent except for those generated by non-Forest Service activities.

PRESCRIPTION: #30

Description: Includes all vegetative and land form types that have been determined to be suitable for wilderness designation.

Management Emphasis and Intensity: Manage for wilderness values while providing livestock grazing and providing recreation opportunities that are compatible with maintaining wilderness values and protecting resources. Work will be confined to operation and maintenance activities. No direct resource improvement.

PRESCRIPTION: #31

Description: Includes those lands that have been determined to be suitable for designation as research natural areas.

Management Emphasis and Intensity: Manage to provide opportunities for nondisruptive research and education. Use restrictions will be imposed as necessary to keep areas in their natural or unmodified condition. There will be no harvest of forest products, including fuelwood. Work will be confined to operation and maintenance activities. No direct resource improvement.

PRESCRIPTION: #32

Description: Lands supporting existing recreational developments. Average slopes less than 15%.

Management Emphasis and Intensity: Manage for a variety of developed recreation opportunities while mitigating the impact on the unique physical, biological and cultural resources. Visual quality objectives will be met. Other activities maintain or enhance the recreational opportunities. Watershed conditions will be maintained or sites closed. Work will be confined to operation and maintenance activities. No direct resource improvement.

PRESCRIPTION: #33

Description: Steep, rugged lands that may be visible from major travel routes. These lands have generally been determined as incapable of or unsuitable for sustained wood harvest and livestock grazing. Slopes are generally greater than 40%. Includes all vegetative types except major riparian areas.

Management Emphasis and Intensity: Manage for visual resources and semi-primitive dispersed recreation opportunities, including those related to wildlife. Visual quality objectives will be met. Work will be confined to operation and maintenance activities. No direct resource improvement.

PRESCRIPTION: #34

Description: Lands capable and suitable for timber harvest, livestock grazing, and game habitat management. Average slopes are 0-40%. All vegetative types including coniferous forest and major riparian areas.

Management Emphasis and Intensity: Manage to protect and perpetuate the basic resources. Meet minimum legal requirements associated with management of public lands and natural resources at the least cost. Those resource outputs that occur are those that can be sustained without new investment or major rehabilitation measures. Watershed stabilization would be limited to those watersheds in less than satisfactory condition. Mitigate the impacts on cultural resources and wildlife habitats. Visual quality objectives will be met. Watershed conditions will be maintained through control of activities. Timber harvest is limited to salvage of dead or dying trees along existing roads. There is no fuelwood harvest.

Moderate Intensity Prescriptions

Continuation of current management intensity within existing (1980) budgets. Operation and maintenance activities are at a moderate level. New investment activities are at a moderate level. New investment activities are at a low to moderate level.

PRESCRIPTION: #1L

Description: Steep, rugged lands, some of which may be visible from major travel routes. These lands have generally been determined as incapable of or unsuitable for sustained wood harvest and livestock grazing. Slopes are generally greater than 40%. Includes all vegetative types except major riparian areas.

Management Emphasis and Intensity: Manage for visual resources and semi-primitive recreation opportunities, including those related to wildlife. Visual quality objectives will be met.

PRESCRIPTION: #2L

Description: Coniferous forest lands that are suitable for a wide variety of recreational and special uses. Includes both suitable and nonsuitable (regeneration problems) timber producing lands. Timber harvest is limited to lands determined to be capable and suitable for timber harvest using tractor logging systems.

Management Emphasis and Intensity: Manage for dispersed recreation opportunities. Uses such as electronic sites and observatories will be permitted on special sites. Sawtimber and fuelwood harvest will be compatible with the recreation oriented opportunities and are done for salvage and sanitation purposes. Visual quality objectives will be met. Watershed conditions will be maintained or improved.

PRESCRIPTION: #3L

Description: Undeveloped grasslands, woodlands coniferous forest and riparian areas that have a high attraction to recreationists. Many are near developed recreation sites and are influenced by the presence of these sites, although not developed themselves. Includes all slope ranges. Includes known essential habitats for threatened and endangered plants and animals.

Management Emphasis and Intensity: Manage for a wide variety of dispersed recreation opportunities while protecting or maintaining the unique physical, biological and cultural resources. Visual quality objectives will be met. Other activities should maintain or enhance the recreational opportunities. Watershed conditions will be improved or maintained.

PRESCRIPTION: #3AL

Description: Lands that are now supporting recreational developments. Average slopes less than 15%.

Management Emphasis and Intensity: Manage for a variety of developed recreational opportunities while mitigating the impact on the unique physical, biological and cultural resources. Visual quality objectives will be met. Other activities maintain or enhance the recreational opportunities. Watershed conditions will be improved or maintained.

PRESCRIPTION: #4L

Description: Lands capable and suitable for fuelwood harvest, livestock grazing, and game habitat management. Average slopes are 0-40%. Includes all vegetative types.

Management Emphasis and Intensity: Manage for a sustained harvest of livestock forage and fuelwood while maintaining existing game animal habitat and soil resources. Mitigate the impacts on cultural resources and nongame wildlife habitats. Visual quality objectives will be met. Dispersed recreation activities may occur except for those that adversely affect the productivity of the land or resources. Watershed conditions will be improved or maintained.

PRESCRIPTION: #7(A)L

Description: Undeveloped lands that have been identified as supporting flora and fauna associations that are unique enough to require special management practices. Includes identified riparian ecotypes. Includes known, essential habitats for threatened and endangered plants and animals.

Management Emphasis and Intensity: Manage to perpetuate the unique wildlife or vegetative species. Improve and manage riparian areas (as defined by FSM 2526, Riparian Watershed Management) to benefit riparian dependent resources. Dispersed recreation activities and other uses will be allowed to the extent they do not degrade the unique values. Facilities will be allowed and maintained for the purpose of protecting these resources.

PRESCRIPTION: #7(B)L

Description: Undeveloped lands that have been identified as supporting flora and fauna associations that are unique enough to require special management practices. Includes identified higher ecosystem extensions. Includes known, essential habitats for threatened and endangered plants and animals.

Management Emphasis and Intensity: Manage to perpetuate the unique wildlife or vegetative species while producing livestock forage and fuelwood on a basis compatible with sustaining the unique resources. Recreation activities and other uses may occur to the extent they do not degrade the unique values. Visual quality objectives will be met. Facilities will be allowed and maintained for the purpose of protecting these resources.

PRESCRIPTION: #8L

Description: Includes those lands that have been determined to be suitable for designation as research natural areas.

Management Emphasis and Intensity: Manage to provide opportunities for nondisruptive research and education. Use restrictions will be imposed as necessary to keep areas in their natural or unmodified condition. There will be no harvest of forest products including fuelwood.

PRESCRIPTION: #8AL

Description: Includes those lands that have been determined to be suitable for both wilderness designation and designation as research natural areas.

Management Emphasis and Intensity: Manage for wilderness values and uses while providing opportunities for nondisruptive research and education. Use restrictions will be imposed as necessary to keep areas in their natural or unmodified condition. There will be no harvest of forest products including fuelwood.

PRESCRIPTION: #9L

Description: Includes all vegetative and land form types that have been determined to be suitable for wilderness designation.

Management Emphasis and Intensity: Manage for wilderness values while providing livestock grazing and providing recreation opportunities that are compatible with maintaining wilderness values and protecting resources. Lightning fires may be used as prescribed fires to meet wilderness resource objectives.

PRESCRIPTION: #22L

Description: Lands capable and suitable for fuelwood harvest, livestock grazing and game habitat management. Average slopes are 0-40%. Includes all vegetative types except coniferous forest areas.

Management Emphasis and Intensity: Manage for a sustained harvest of live-stock forage while maintaining existing game animal habitat and soil resources. Mitigate impacts on cultural resources and nongame wildlife habitats. Visual quality objectives will be met. Dispersed recreation activities may occur except for those that adversely affect the productivity of the land or resources. Watershed conditions will be improved or maintained. Fuelwood cutting will be limited to occasional personal use.

High Intensity Prescriptions

Operation and maintenance activities and new investment activities are increased as necessary to resolve issues and concerns, and increase resource opportunities.

PRESCRIPTION #1H

Same description and emphasis as P1L. Management intensity is increased for dispersed recreation operation and maintenance activities and wildlife habitat improvement.

PRESCRIPTION #2H

Same description and emphasis as P2L. Management intensity is increased for dispersed recreation operation and maintenance activities to provide high quality experiences. Timber management activities are increased to improve vigor of stands which results in improved wildlife habitat and increased fuelwood opportunities. Road maintenance is increased to support increased activity in resource management.

PRESCRIPTION #3H

Same description and emphasis as P3L. Management intensity is increased for dispersed recreation operation and maintenance activities (including road maintenance) to create high quality experiences.

PRESCRIPTIONS #4H and 22H

Same description and emphasis as P4L and P22L. Management intensity is increased for range and watershed operation, maintenance and investment activities to shorten the time span for improving rangeland and watershed conditions. Wildlife habitat improvement opportunities are increased. Road maintenance and construction is increased to improve recreation and fuelwood harvest opportunities.

PRESCRIPTIONS #7H and #7AH

Same description and emphasis as P7L and P7AL. Management intensity is increased for all operation, maintenance and investment activities necessary to maintain or improve the condition of riparian areas and higher ecosystem extensions.

PRESCRIPTIONS #8H and #8AH

Same description and emphasis at P8L and P8AL. Management intensity is increased for operation and maintenance activities to totally manage recreation activities within research natural areas.

PRESCRIPTION #9H

Same description and emphasis as P9L. Management intensity is increased for wilderness recreation operation, and maintenance activities (including trail maintenance) to increase the experience level.

PRESCRIPTION: #3BH

Description: Lands that are suitable and capable of supporting existing or new recreational developments. Average slopes less than 15%.

Management Emphasis and Intensity: Manage for a variety of developed recreation opportunities while mitigating the impact on the unique physical, biological and cultural resources. Manage for high quality recreation experience. Visual quality objectives will be met. Other activities maintain or enhance the recreational opportunities. Watershed conditions will be improved or maintained.

PRESCRIPTION: #6H

Description: Lands that are capable and suitable for livestock grazing, fuelwood harvest, and intensive game animal habitat management. Slopes are generally less than 40%. Includes all vegetative types.

Management Emphasis and Intensity: Manage for intensive game animal habitat maintenance and improvement. Production of livestock forage and fuelwood will be compatible with management of the game habitat. Visual quality objectives will be met or exceeded. Impacts on cultural resources and habitats for other wildlife will be fully mitigated. Dispersed recreation activities may occur except for those that adversely affect productivity of the land or resources. Watershed conditions will be improved.

PRESCRIPTION: #14H

Description: Undeveloped lands that have been identified as supporting flora and fauna associations that are unique enough to require special management practices, including formal designation as a zoological or botanical area. Includes known, essential habitats for threatened and endangered plants and animals.

Management Emphasis and Intensity: Manage to perpetuate the unique wildlife or vegetative species. Improve and manage riparian areas (as defined by FSM 2526, Riparian Watershed Management) to benefit riparian dependent resources. Recreation activities and other uses may occur to the extent they do no degrade the unique values. Facilities may be allowed and maintained for the purpose of protecting these resources. Visual quality objectives will be met or exceeded.

PRESCRIPTION: #15H

Description: Steep, rugged lands some of which may be visible from major travel routes. These lands have generally been determined as incapable of or unsuitable for sustained wood harvest and livestock grazing. Slopes are generally greater than 40%. Only applicable to the Dragoon, Peloncillo, Pedragosa, Galiuro, Santa Teresa, Greasewood, Winchester and Whetstone Mountain Ranges. These are the more isolated areas where high value improvements are generally lacking.

Management Emphasis and Intensity: Manage for visual resources and semi-private recreation opportunities, including those related to wildlife. Manage for high quality experience level. Visual quality objectives will be met. Management intensity for wildfire suppression emphasizes the least cost techniques.

PRESCRIPTION: #16H

Description: Lands capable and suitable for fuelwood harvest, livestock grazing and game habitat management. Average slopes are 0-40%. Includes all vegetative types except major riparian areas. Only applicable to the Dragoon, Peloncillo, Pedragosa, Galiuro, Santa Teresa, Greasewood, Winchester and Whetstone Mountain Ranges. These are the more isolated areas where high value improvements are generally lacking.

Management Emphasis and Intensity: Manage for a sustained harvest of livestock forage and fuelwood while maintaining existing game animal habitat and soil resources. Mitigate the impacts on cultural resources and nongame wildlife habitats. Visual quality objectives will be met. Dispersed recreation activities

may occur, except for those that adversely affect the productivity of the land or resources. Watershed conditions will be improved or maintained. Management intensity for wildfire suppression emphasizes the least cost techniques.

PRESCRIPTION: #17H

Description: Lands that are capable and suitable for livestock grazing, fuelwood harvest, and intensive game animal habitat management. Slopes are generally less than 40%. Includes all vegetative types. Only applicable to the Dragoon, Peloncillo, Pedragosa, Galiuro, Santa Teresa, Greasewood, Winchester and Whetstone Mountain Ranges. These are the more isolated areas where high value improvements are generally lacking.

Management Emphasis and Intensity: Manage for intensive game animal habitat maintenance and improvement. Production of livestock forage and fuelwood will be compatible with management of the game habitat. Visual quality objectives will be met or exceeded. Impacts on cultural resources and habitats for other wildlife will be fully mitigated. Dispersed recreation activities may occur except for those that adversely affect productivity of the land or resources. Watershed conditions will be improved. Management intensity for wildfire suppression emphasizes the least cost techniques.

PRESCRIPTION: #19H

Description: Includes those lands that have been determined to be suitable for designation as research natural areas.

Management Emphasis and Intensity: Manage to provide opportunities for nondisruptive research and education. Use restrictions will be imposed as necessary to keep areas in their natural or unmodified condition. There will be no harvest of forest products, including fuelwood. Lightning fires may be used as prescribed fires to meet natural area objectives.

PRESCRIPTION: #19AH

Description: Includes those lands that have been determined to be suitable for both wilderness designation and designation as research natural areas.

Management Emphasis and Intensity: Manage for wilderness values and uses while providing opportunities for nondisruptive research and education. Use restrictions may be imposed as necessary to keep areas in their natural or unmodified condition. There will be no harvest of forest products including fuelwood. Lightning fires may be used as prescribed fires to meet natural area objectives.

PRESCRIPTION: #20H

Description: Includes all vegetative and land form types that have been determined to be suitable for wilderness designation.

Management Emphasis and Intensity: Manage for wilderness values while providing livestock grazing and providing recreation opportunities that are compatible with maintaining wilderness values and protecting resources. Natural and man-set fire will be used under prescribed conditions to meet wilderness objectives. Manage for a high quality wilderness recreation experience.

PRESCRIPTION: #21H

Description: Includes all vegetative and land form types that have been determined to be suitable for wilderness designation. Only applicable to the Dragoon, Peloncillo, Pedragosa, Galiuro, Santa Teresa, Greasewood, Winchester and Whetstone Mountains. These are the more isolated areas where high value improvements are generally lacking.

Management Emphasis and Intensity: Manage for wilderness values while providing livestock grazing and providing recreation opportunities that are compatible with maintaining wilderness values and protecting resources. Natural and man-set fires

may be used as prescribed fires to meet wilderness objectives. Manage for a high quality wilderness recreation experience. Management intensity for wildfire suppression emphasizes the least cost techniques.

Maximum Intensity Prescriptions

Maximum management intensity to emphasize specific resources. Operation and maintenance activities and new investment activities are increased to levels necessary to sustain the emphasized resource at maximum levels. Other resources are maintained to meet all legal requirements as a minimum. Some may be increased or improved along with the emphasized resource.

Developed, dispersed, and wilderness recreation opportunities and experiences are maximized through application of the previous high intensity prescriptions. Watershed improvement is maximized through application of the high intensity and maximum intensity prescriptions.

PRESCRIPTION: #2M

Description: Lands capable and suitable for timber harvest using either tractor or cable logging systems. Average slopes are 0-40%. Includes mixed conifer and spruce-fir types.

Management Emphasis and Intensity: Maximize timber harvest while meeting at least minimum legal standards for other resources. Use any available or reasonable predictable technology to harvest and regenerate timber except fertilizers or genetically improved stock.

PRESCRIPTION: #4O

Description: Lands suitable for livestock grazing. Average slopes are 0-40%. All vegetative types including coniferous forest and major riparian areas. Does not include existing or recommended wilderness areas, existing research natural areas or developed recreation sites.

Management Emphasis and Intensity: Manage to maximize livestock grazing capacity using available and reasonable technology. Meet at least the minimum legal constraints for other resources.

PRESCRIPTION: #41

Description: All lands capable and suitable of supporting various native wildlife species. Does not include developed recreation sites.

Management Emphasis and Intensity: Improve and maintain wildlife habitat to provide the maximum diversity for all existing or previously existing species with emphasis on game, special interest nongame and threatened and endangered species. Use any available or reasonably predictable technology to achieve these results. Meet at least minimum legal constraints for other resources.

Table 1. Acres by Management Prescription for Each Alternative (M Acres)

Management Prescription		Alternative					
		PA	A	B	C	D	E
		(M Acres)					
Low Intensity (Minimum management to meet legal requirements.)							
P30	Wilderness	225.1	0	0	0	0	0
P31	Natural Area	0.9	0	0	0	0	0
P32	Developed Recreation	0	0	0	0	0	0
P33	Semi-Primitive Dispersed Recreation	26.2	0	0	0	0	0
P34	Multiple Use	134.8	0	0	0	0	0

Table 1. Acres by Management Prescription for Each Alternative (M Acres) (Continued)

Management Prescription		Alternative					
		PA	A	B	C	D	E
		(M Acres)					
Current (Moderate) Intensity (Continuation of current management levels within existing budgets).							
P1L	Semi-Primitive Dispersed Recreation	0	100.5	0	0	0	0
P2L	Dispersed Rec/Timber	0	31.9	0	0	30.6	0
P3L	Motorized Dispersed Recreation	9.2	14.9	0	0	0	0
P3AL	Developed Recreation	4.0	4.0	0	0	0	0
P4L	Livestock/Game/ Fuelwood	380.3	748.8	0	0	0	0
P7L	Unique/Fuelwood	14.8	17.4	0	0	0	0
P7AL	Unique/Dispersed Rec.	20.7	25.7	21.6	0	0	21.6
P8L	Natural Area	0	3.8	0	0	0	0
P8AL	Natural Area/Wilderness	0	5.7	0	0	0	0
P9L	Wilderness	36.0	333.5	0	0	0	0
P9L	Wilderness Study Area	0	90.8	0	0	0	0
P22L	Livestock/Game	123.3	349.5	0	0	0	0
High Intensity (Increased management to resolve I.C.O.s.)							
P1H	Semi-Primitive Dispersed Recreation	48.0	0	73.1	105.7	53.2	72.2
P2H	Dispersed Rec./Timber	0	0	0	0	0	30.6
P3H	Motorized Dispersed Recreation	0.4	0	0	0.7	0.7	0.4
P3BH	Developed Recreation	0.2	0	6.7	6.7	4.7	4.7
P4H	Livestock/Game/ Fuelwood	0	0	8.2	8.2	0	364.0
P6H	Game/Livestock	241.9	0	0	734.6	705.7	374.1
P7H	Unique/Fuelwood	2.3	0	0.8	0	0	17.1
P7AH	Unique/Dispersed Recreation	3.8	0	0.9	6.0	11.8	13.2
P8H	Natural Area	0	0	0	0	0	0
P8AH	Natural Area/Wilderness	0	0	0	0	0	0
P9H	Wilderness	1.9	0	1.8	1.9	2.4	1.8
P14H	Zoological/Botanical	2.8	0	0.1	0.1	9.3	0.4
P15H	Non-motor Dispersed	40.0	0	38.6	50.7	32.1	40.0
P16H	Livestock/Game Fuelwood	251.3	0	147.7	98.1	33.8	223.4
P17H	Game/Livestock	2.5	0	2.5	281.0	227.3	143.0
P19H	Natural Area	3.6	0	3.6	3.6	6.1	3.6
P19AH	Natural Area/Wilderness	4.7	0	4.7	4.7	5.3	4.7
P20H	Wilderness	84.9	0	283.2	346.0	345.4	346.0
P21H	Wilderness	47.7	0	48.5	70.3	76.5	58.8
P21H	Primitive Recreation	0	0	0	0	143.8	0
P22H	Livestock/Game	0.9	0	0	3.5	0	0
Maximum Intensity (Maximum management to emphasize single resources.)							
P2M	Timber	0	0	0	0	0	0
P40	Livestock	0	0	1079.6	0	0	0
P41	Wildlife	14.3	0	4.9	4.7	37.8	6.9

Table 2. Final Prescription Allocation by Management Area.[1/]

No.	Management Area Emphasis	Management Prescriptions	Thousand Acres By Alternatives PA	A(Current)	B(RPA)	C	D	E
1	Manage for visual resources and semi-primitive non-motorized and motorized dispersed recreation opportunities.	P33	26.1	0	0	0	0	0
		P1L	0	100.5	0	0	0	0
		P1H	31.6	0	73.1	105.7	53.3	72.2
		P15H	40.0	0	38.6	50.7	32.1	40.0
		Sub Totals	97.7	100.5	111.7	156.4	85.4	112.2
2	Manage for a variety of dispersed recreation opportunities. Timber and fuelwood harvest benefit recreation and wildlife values.	P34	0.6	0	0	0	0	0
		P2L	0	31.9	0	0	30.6	0
		P2H	0	0	0	0	0	30.6
		P1H	16.4	0	0	0	0	0
		P41	13.7	0	0	0	0	0
		Sub Totals	30.7	31.9	0	0	30.6	30.6
3	Manage for a wide variety of dispersed recreation opportunities	P3L	9.2	14.9	0	0	0	0
		P3H	0.4	0	0	0.7	0.7	0.4
		P6H	4.8	0	0	0	0	0
		P41	0.4	0	0	0	0	0
		Sub Totals	14.8	14.9	0	0.7	0.7	0.4
3A & 3B	Manage for a variety of developed recreation opportunities. (Existing and new sites)	P3AL	4.0	4.0	0	0	0	0
		P3BH	0.2	0	6.7	6.7	4.7	4.7
		Sub Totals	4.2	4.0	6.7	6.7	4.7	4.7
4	Manage for sustained production of livestock forage, fuelwood, and game animal habitat.	P34	134.2	0	0	0	0	0
		P4L	380.3	748.8	0	0	0	0
		P4H	0	0	0	0	0	364.0
		P6H	237.1	0	0	0	0	0
		P16H	251.3	0	0	0	0	223.4
		P17H	2.5	0	0	0	0	0
		P22L	123.3	0	0	0	0	0
		P22H	0	0	0	0	0	0
		Sub Totals	1128.7	748.8	0	0	0	587.4
6	Manage for intensive game animal habitat maintenance and improvement. Production of livestock forage and fuelwood will be compatible with management of the game habitat.	P4H	0	0	0	8.2	0	0
		P6H	0	0	0	733.4	699.5	374.1
		P16H	0	0	0	98.1	33.8	0
		P17H	0	0	0	280.7	221.3	143.0
		P22H	0	0	0	3.5	0	2.8
		P41	0	0	0	4.5	0	0
		Sub Totals	0	0	0	1128.4	954.6	519.9

Table 2. Final Prescription Allocation by Management Area.[1/] (Continued)

No.	Management Area Emphasis	Management Prescriptions	Thousand Acres By Alternatives PA	A(Current)	B(RPA)	C	D	E
7	Manage to perpetuate the unique wildlife or vegetative species. Other resource uses will be compatible with sustaining the unique resources.	P7L	14.8	17.4	0	0	0	0
		P7H	2.3	0	0.8	0	0	17.1
		P7AL	20.7	25.7	21.6	0	0	21.6
		P7AH	3.8	0	0.9	6.0	11.8	13.6
		P41	0	0	0	0	37.2	3.0
		Sub Totals	41.6	43.1	23.3	6.0	49.0	55.3
8	Manage to provide opportunities for nondisruptive research and education. (Research Natural Areas)	P8L	0	3.8	0	0	0	0
		P8H	0	0	0	0	0	0
		P19H	3.4	0	3.8	3.8	6.1	3.8
		P41	0	0	0	0	0.6	0
		Sub Totals	3.4	3.8	3.8	3.8	6.7	3.8
8A	Manage for wilderness values and uses while providing opportunities for nondisruptive research and education. (Research Natural Areas)	P31	0.9	0	0	0	0	0
		P8AL	0	5.7	0	0	0	0
		P8AH	0	0	0	0	0	0
		P19AH	2.7	0	2.0	1.9	8.6	1.9
		Sub Totals	3.6	5.7	2.0	1.9	8.6	1.9
9	Manage for wilderness values while providing livestock grazing and recreation opportunities that are compatible with wilderness. (Existing and New Areas)	P30	225.1	0	0	0	0	0
		P9L	36.0	333.5	0	0	0	0
		P9H	1.8	0	1.8	1.9	1.8	1.8
		P20H	86.9	0	286.9	349.6	330.2	349.7
		P21H	47.8	0	48.5	70.3	73.1	58.8
		Sub Totals	397.6	333.5	337.2	421.8	405.1	410.3
14	Manage to perpetuate the the unique wildlife or vegetative species. (Zoological-Botanical Areas)	P14H	4.2	0	0.2	0.8	21.0	0
		Sub Total	4.2	0	0.2	0.8	21.0	0
14W	Manage for wilderness values while perpetuating the unique wildlife or vegetative species. (Zoological-Botanical	P20H	0	0	0	0	12.8	0
		P21H	0	0	0	0	3.5	0
		Sub Totals	0	0	0	0	16.3	0
22	Manage for sustained production of livestock forage and game animal habitat. Fuelwood harvest is restricted to occasional removal of dead and down material.	P22L	0	349.5	0	0	0	0
		Sub Totals	0	349.5	0	0	0	0

Table 2. Final Prescription Allocation by Management Area.[1/] (Continued)

Management Area No.	Management Area Emphasis	Management Prescriptions	Thousand Acres By Alternatives PA	A(Current)	B(RPA)	C	D	E
40	Manage to maximize livestock grazing capacity while meeting at least minimum legal requirements for other resources	P4H	0	0	8.1	0	0	0
		P16H	0	0	147.7	0	0	0
		P17H	0	0	2.5	0	0	0
		P40	0	0	1079.6	0	0	0
		P41	0	0	3.7	0	0	0
		Sub Totals	0	0	1241.6	0	0	0
PR	Manage for primitive recreation opportunities.	P9H	0	0	0	0	0.6	0
		P20H	0	0	0	0	45.6	0
		P21H	0	0	0	0	97.6	0
		Sub Totals	0	0	0	0	143.8	0
WS	Manage to protect future wilderness values. (Wilderness Study Areas)	P9L	0	90.8	0	0	0	0
		Sub Totals	0	90.8	0	0	0	0
		Grand Totals	1726.5	1726.5	1726.5	1726.5	1726.5	1726.5

[1/] The Interdisciplinary Team made minor changes in prescription allocations to create manageable boundaries for research natural areas, zoological areas, and wilderness areas.

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